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A SKETCH OF THE LIFE OF ROBERT BRIDGES, M. D.

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A man whose honest conduct and toil through a long life contribute, in any marked degree, towards the comfort or enlightenment of his fellows, or the good name of the community in which he lived, earns a claim to kindly remembrance after he has left the field of his labor forever. It is good for the living to know something of his ways and services, though he may not have won a foremost place among the leaders of science or of letters. Even an imperfect sketch of the life of a man who has striven to increase or to diffuse knowledge is more or less valuable, because it may incite others to emulate his example, and toil patiently among followers till qualified to fill a chief's place. If the reputation of a workman is in proportion to the quality and quantity of his work, then a fair relation of what Dr. Bridges has done will suffice to secure, without aid of rhetoric, the degree of encomium which his life deserves in this connection. A kind and generous disposition enhanced the merit of his work. He did much that brought no pay beyond the satisfaction which comes from doing to help others, and to contribute to the common progress. His life was characterized by uniform, unremitting labor.

The details of this sketch may be somewhat tiresome, but, as they contain the gist, all the testimony in the case, they may be patiently heard, at least, if not excused.

The ancestry of Dr. Robert Bridges is traced to Edward Bridges, who, in 1648, was a lieutenant of the English Army. Edward, his eldest son, who was an architect, married in 1692. He left two sons. The elder, named Edward, married Catherine Bullen. He was a merchant in Cork. He had six sons and two daughters. Edward, the eldest of the sons, who also was a merchant in the city of Cork,

married a second wife in Rotterdam, Cornelia, the second daughter of Thomas Culpeper, of Kent county, England. By her he had four children. Edward, their third son, settled in Philadelphia, and, in 1739, was established at a corner of Front and Walnut streets, in the dry goods trade. His place of business was commonly called "the Scales." He left three sons: Edward John, who was born in Rotterdam, in 1736, and died in Jamaica, Surgeon of the *Africa*, a sixty-four gun ship; Culpeper, who died a midshipman on board of the *Northumberland*, at the siege of Louisburg, Cape Breton, 1758, and Robert, who was born in Philadelphia, November 18, 1739, and married, in 1769, Jemima Sheppard, of Bensalem township, Bucks county, Pa. He had five sons, Barnsley, Robert (who probably died young), Culpeper, Robert and Edward; and five daughters, Cornelia, Mary, Sarah, Harriet and Emily. Robert Bridges was a sailmaker. His residence was at (old number) 259 South Front street, and his sail-loft was on the wharf, Delaware avenue, north of Lombard street. James Forten, an almost "colorless colored man," was his foreman, and, in 1800, when Robert Bridges died, succeeded him in business. Culpeper Bridges, the third son of Robert, the sailmaker, was born in Philadelphia, December 21, 1776, and died December 29, 1823. He was trained to be a merchant by John Leamy, whose "counting-house" was at the southeast corner of Walnut and Third streets. He married, February 21, 1804, Sarah, the fifth daughter and eleventh child of William Cliffton, of Southwark, a blacksmith and machinist, and had two sons, William Cliffton, and Robert, the subject of this sketch, who was born in Philadelphia, March 5, 1806.

This outline of lineage, which is purely English, implies that the ancestors of Dr. Bridges, were vigorous, enterprising, intelligent, industrious and respectable.

Both sons were liberally educated; both were pupils in the University Grammar School. William Cliffton graduated from the department of arts of the University of Pennsylvania in 1821. Robert was for a short time one of the sophomores of the University—there was no freshman class at that period—and then, for no assigned reason, entered Dickinson College, Carlisle, Pa., from which he graduated in 1824. In July of the same year he was elected a member of the Societas Philosophiæ Consociata of the College.

Immediately after his return to Philadelphia he became a pupil of Dr. Thomas T. Hewson, and remained under the instruction of that

eminent medical teacher and surgeon nearly four years. He had associated with him, in teaching his large class of students, several assistants. His office was a two-storied house, on the north side of Library street, near to Fourth street. In it were a students' reception-room, a laboratory and a lecture-room, and, in the rear of the house, a dissecting-room. In Dr. Hewson's private medical school Dr. Franklin Bache taught chemistry. He appointed young Bridges his assistant very soon after he began his medical studies. In this capacity he served Dr. Bache through many years in the courses of chemical lectures delivered by him in the Franklin Institute, in the Philadelphia College of Pharmacy, and at the Jefferson Medical College. This practical training made him an expert chemist and an admirable teacher of chemistry.

His close attention, habitually given to whatever he might be doing, qualified him in a high degree to assist the lecturer on chemistry. In May, 1827, upon pouring water into an iron mercury flask, which had been used for obtaining oxygen from nitre, for the purpose of washing it, he noticed a lively effervescence. He proceeded at once to investigate the nature of the gaseous matter, and found it to consist of oxygen of a purity of ninety-five per cent., as he ascertained by Dr. Hare's accurate sliding-rod eudiometer. He observed the same phenomenon, November 27, at the Franklin Institute, and found in this instance that the oxygen contained only one per cent. of impurity. He suggested that this residuum, which Dr. Hare conjectured to be peroxide of potassium, would furnish pure oxygen to the experimenter without trouble. He was anticipated in this discovery. Mr. Richard Philips, of London, had made the same observation and given the same rationale of the phenomenon, an account of which he published in the "Annals of Philosophy" for April, 1827. Nevertheless, Dr. Franklin Bache published in the "North American Medical and Surgical Journal" for January, 1828, a note of the observation of "Mr. Robt. Bridges, student of medicine," on the Residuum of Nitre after Exposure to Red Heat." The circumstance indicates his character as a student, and at the same time Dr. Bache's kind appreciation of his worth.

Dr. Bridges graduated from the medical department of the University of Pennsylvania, March, 1828. "Neuralgia" was the subject of his thesis. He immediately opened an office at the southeast corner of Vine and Thirteenth streets, where he remained till 1837. He did

not obtain a lucrative practice. His mother died, February 19, 1839, in the fifty-eighth year of her age, a loss generally among the saddest in man's experience.

He was elected a member of the Academy of Natural Sciences of Philadelphia, January, 1835; of the Franklin Institute, January, 1836; a resident member of the Philadelphia College of Pharmacy, December, 1838; a fellow of the College of Physicians of Philadelphia, July, 1842; and he was chosen a member of the American Philosophical Society, January 19, 1844.

At the Franklin Institute Dr. Franklin Bache taught chemistry, as lecturer and professor,[1] from September, 1826, till 1831. During the whole period, five years, Dr. Bridges was his assistant. After that time he did not participate in the proceedings of the Society, though he was occasionally present at its meetings.

As already stated, he was an active and prominent member of the Academy of Natural Sciences, but all his time was not given to it. He labored most earnestly in another institution, the Philadelphia College of Pharmacy, with which his career was so closely associated, that, to understand it clearly, a statement of the circumstances which attended the origin and progress of the College seems necessary.

A National Convention of Physicians assembled at Washington, D. C., January 1, 1820, for the purpose of devising a code of formulas, and establishing it as the sole standard for medicinal preparations. The object was to have them made exactly alike in composition and strength by all physicians and apothecaries throughout the land. The result of the labors of the convention of January, 1820, was the publication, at Boston, Mass., December 15, 1820, of the first Pharmacopœia of the United States of America, and since, of decennial revisions of it, the sixth of which is now in use.

Dr. Bridges was among the most skillful of those who labored to perfect the Pharmacopœia. The Philadelphia College of Pharmacy appointed him, March, 1847, one of a committee to revise the issue of 1840, and prepare the report on it to be given to the National Convention of 1850, the first in which pharmacists were represented. He assisted on a committee of the College of Physicians, appointed February, 1868, to report on the fourth decennial revision; was one of the delegates from the college to the meeting of the National Conven-

[1] Dr. Bache was appointed lecturer on chemistry, September, 1826, and professor, March, 1828.

tion of 1870, and was a member of the Committee on Publication of the fifth decennial revision. In July, 1877, the College of Physicians appointed him one of a committee to revise the Pharmacopœia of 1870, and prepare a report on it for the National Convention of 1880.

About the time when the first National Convention met, the drug and apothecary business was regarded as a trade rather than as a profession based on scientific principles, as it is now. It was known that deteriorated drugs were sold, and that valuable preparations in daily use were adulterated or made of materials of inferior quality. Such abuses were charitably ascribed to ignorance of pharmacy which was supposed to prevail among druggists and apothecaries generally.

To remedy this lamentable condition of the apothecary's vocation, some three score of intelligent, philanthropic men, including a large proportion of members of the Society of Friends, associated in this city and founded, February 23, 1821, the Philadelphia College of Pharmacy, a society which was incorporated, March 30, 1822, with all legal authority necessary to establish and support a school of pharmacy. The University of Pennsylvania had then recently provided for teaching pharmacy in connection with materia medica, and conferring the degree of Master of Pharmacy, which was conferred the first time in the spring of 1821 on sixteen graduates. This action of the University, it was said, greatly influenced, if it did not determine, the formation of the society known as the Philadelphia College of Pharmacy.

It consists of active or resident, honorary and corresponding members. The conduct of its ordinary affairs is confided to eighteen trustees, one-sixth of whom are elected semi-annually by the college. The stated meetings of the board of trustees are monthly, and of the college, quarterly.

The first courses of lectures, which were limited to materia medica and chemistry, were given in the winter of 1821–22, but the degree of "graduate of pharmacy" was not conferred till the spring of 1826, when there were three graduates. The lectures were delivered in a building on the west side of Seventh, between Market and Chestnut streets, the site of which is now occupied by the Gas Office of the city.

In 1832 the society erected for its use a building on the south side of Zane, now Filbert street, west of Seventh, and occupied it until the

college was established in its present well-adapted quarters, No. 145 North Tenth street, September, 1868.

Under the authority of the Society, the "American Journal of Pharmacy," which is devoted to the advancement of pharmaceutical knowledge, and the advocacy of thorough education of pharmacists, was established in 1825. It was issued quarterly, till 1853, then bi-monthly till 1871, since that date, monthly, and continues to be a prosperous periodical. Dr. Bridges was assistant editor of this journal about six years, from 1839 till 1845, and contributed several original papers to it.

The college grew very slowly. But the strict probity observed in its management and the great care taken to select only the most competent and conscientious teachers, have enabled it to surmount all impediments in the way of its progress. Now, graded courses of instruction are given on materia medica, botany, the theory and practice of pharmacy, chemistry (practical and analytical), and pharmaceutical manipulation, by a faculty consisting of four professors and three assistants. The teaching is very thorough. Since the establishment of the school, 7,109 students have matriculated, upon 2,049 of whom, 28·82 per cent., the degree of graduate in Pharmacy has been conferred.[1]

Dr. Bridges entered the college, May, 1831, as private assistant of the professor of chemistry, Dr. Franklin Bache, and was elected an active member of the society December 18, 1838, and, March 25, 1839, a member of the Board of Trustees, and also of the Publication Committee, to which he was annually elected, till 1861, twenty-one years, when he declined re-election. He was elected chairman of the Board of Trustees, October 9, 1860, and, being annually re-elected, held the position till the close of his life. When Dr. Bache gave up the chair of chemistry to take the professorship of the same department in the Jefferson Medical College, Dr. Bridges was a candidate for the vacant place, but Dr. Wm. R. Fisher was elected, May 31, 1841, by a majority of two votes. He resigned the following April, and Dr. Bridges was unanimously elected Professor of General and Pharmaceutical Chemistry, May 16, 1842. Still he continued to be the private assistant of Dr. Bache, till his death, in 1864, severed their continuous laboratory association of forty years. Dr. Bridges, also aided Dr. George B.

[1] Sixty-third Annual Announcement of the Philadelphia College of Pharmacy, 1883.

Wood in his work while he held the professorship of materia medica in the University of Pennsylvania, from 1835 till 1850.

Besides the routine work of the professorship, Dr. Bridges did his full share on standing and special committees, delivered many introductory and other addresses, and represented the College among its delegates to the American Pharmaceutical Association and other bodies.

The painstaking and kindly ways of Dr. Bridges in teaching, won for him affectionate and enduring respect from those whom he taught. At the commencement, March, 1867, a portrait of him in oil, was presented to the college by the Zeta Phi Society, and the graduating class, at the commencement, March, 1877, presented to him a stem-winding gold watch.

The additional labor imposed by adopting the method of teaching in graded courses, induced Dr. Bridges, in June, 1878, to procure an assistant. And in January, 1879, at a meeting of the Board of Trustees, he stated informally that his impaired health constrained him to announce that he would relinquish the chair of chemistry at the close of the course. On hearing of his intended resignation, the graduating class of one hundred and fourteen members, representing eighteen States, held a meeting and adopted a preamble and resolutions, expressing regret, sympathy, and for themselves as well as their predecessors, "profound respect for Dr. Bridges as a chemist, and their most grateful esteem for him as their friend and instructor," and earnestly invoking the divine blessing upon his remaining years.

He tendered his resignation in a letter dated March 4, 1879. At a meeting of the Board of Trustees, March 14, a preamble and resolutions were unanimously adopted, stating in substance that he had devoted his time and abilities to a conscientious discharge of the trust assigned him for a long period, during which the professors received a scanty remuneration, that "to his sound judgment and patient labor" the success of the college is much indebted; that the good work he has accomplished has its record in those who have been his pupils in the college—about five thousand—and that he has the sincere thanks and sympathy of the Board.

At the celebration of its twenty-fifth anniversary, March 11, 1879, the Phi Zeta Society, which is composed of alumni of the college, created a scholarship and named it the Robert Bridges scholarship, as

a token of its high estimation of his character and official services. The Board of Trustees, after due deliberation, "in view of his faithful and efficient labors," conferred upon him, May 6, 1879, the title of Emeritus Professor of Chemistry, with an annual salary of one thousand dollars, to be paid in equal installments quarterly, in advance, during his life, from the first day of July ensuing.

In the spring of 1842, the Philadelphia Association for Medical Instruction was formed. The constituent members or founders of it were Dr. John F. Meigs, who taught obstetrics till 1845, and afterwards lectured on the diseases of children; Dr. Joshua M. Wallace, who taught surgery; Dr. Robert Bridges, chemistry; Dr. Francis Gurney Smith, Jr., physiology; and Joshua M. Allen, anatomy. Dr. Bridges was the only constituent member of the Association who remained in it until it was dissolved at the close of 1860, a period of eighteen years. Several retired to accept professorships in medical colleges, and their places were supplied by new appointments, so that during the career of the Association the names of many distinguished physicians are recorded on its list of members.[1]

Dr. Bridges was elected professor of chemistry in the Franklin Medical College in 1846, and filled the office till the institution was dissolved in 1848.

His contributions to medical and scientific literature are valuable, but not very numerous. His papers in the "American Journal of Pharmacy" are entitled, "Chemical Symbols," and "Pyroacetic Spirit and its Derivative Compounds," in 1839; "The Manufacture of Sulphuric Acid," and the "Adulteration of Lac Sulphuris," in 1840; "Notice of Professor Kane's Researches on Ammoniacal Compounds," "Poisoning by long continued use of Acetate of Lead," in 1841; "Observations on two species of Aristolochia which afford Serpentaria," "Observations on the Action of Ether on Galls," "Report on Procter's Hydrated Peroxide of Iron," in 1843. "Experiments on the Absorb-

[1] David H. Tucker, William V. Keating, J. H. B. McClellan, Ellerslie Wallace, Addinell Hewson, John H. Brinton, S. Weir Mitchell, Alfred Stillé, Morton Stillé, J. M. DaCosta, Francis West, James Darrach, and Edward Hartshorne, were teachers in this Association. Including the constituent members, a corps of better qualified instructors than those associated in this summer school could not be easily found anywhere.

ing Power of Anthracite," "Precipitated Carbonate of Lime," "Solution of Iodide of Iron," "Solidification of Carbonic Acid," in 1844; "Pil. Hydrargyri," in 1846, and "Southern Prickly-Ash bark," in 1865. In July, 1845, Dr. Bridges "edited with additions" the American reprint of "Elementary Chemistry, Theoretical and Practical," by George Fownes, and subsequently several editions of this popular volume. The latest American, from the twelfth English edition of the work, was issued May, 1878. He also edited, 1852, the American reprint of Graham's "Elements of Chemistry." From 1854 till 1877, inclusive, he contributed very many bibliographical notices and reviews, chiefly of works on chemistry, to the "American Journal of the Medical Sciences." He assisted Dr. George B. Wood in the preparation of the twelfth, 1865, the thirteenth, 1870, and the fourteenth, 1877, editions of the "United States Dispensatory," a leading work on materia medica and pharmacy of such acknowledged excellence and accuracy as to be generally accepted as authority in the premises.

During the last few years of his life, Dr. Bridges endured most patiently the constant molestations and frequent pain, which attend chronic cystitis. His repose at night, broken into a series of hourly naps, did not bring to him for the next day the refreshing effect of normal sleep; and so his physical vigor was continuously abated, and his mental pursuits greatly disturbed. But in spite of worry from this condition of his health, he was serenely cheerful and manifested his usual interest in scientific topics. Within a few days of the completion of the seventy-sixth year of his age, he died, February 20, 1882, in the house he had occupied with his brother and family twenty-eight years.

He was never married. His generous and sympathetic kindness, self-sacrificing spirit and habitual amiability won the almost filial love and respect of his brother's many children. Their devotion to him is conclusive evidence of his domestic qualities and the tenderness of his nature.

Frugal in his living, punctual and loyal to all duties, accurate, learned, unremittingly industrious, rigidly self-respecting and pure in conduct in every sense, he worked faithfully throughout his long life, but did not reap compensation commensurate with his toil. He lacked of that self-asserting, aggressive spirit which leads many a good man to fortune under circumstances in which one of far greater intrinsic worth often fails only because he is too shy, too modest to assert his

claims to consideration. He was always content to leave to others the appraisement of his worth. Without being ready in debate or at all eloquent in speech, he was an admirable and efficient teacher, as thousands of his pupils can testify. They will teach his lessons and thus long continue and expand the beneficent influence of his instruction and example.

Though he was baptized in the Protestant Episcopal Church, and was occasionally present at its services, he seemed to hold views in harmony with the tenets of the Society of Friends, of which his mother and her ancestors were members.

Dr. Bridges was notably reticent about himself among his most intimate friends. He left no letters or papers bearing testimony to his merits. A friend who had been intimate with him during a third of a century, says, in a letter, September 10, 1881: "Few men in this world—and I have met many who are good and generous—have ever, in my judgment, with such self-sacrificing generosity, bestowed as heartily their sympathy and their best efforts to gladden the lives of those around them, as our friend Bridges has always done. And the quiet, earnest and unflagging way in which he has bestowed the best energies and all the small rewards of his life among his friends is beautiful to behold. * * * * * *

"I am quite surprised to hear that he is able and enjoys so much exercise as to go twice a day to the cool hall of the Academy to read in the library. I am very glad of it, and, especially, as he will there have the benefit of the refreshing atmosphere of that large room; and will enjoy the very best thing for him, not unfrequent meeting with old acquaintances, and always find most congenial topics of conversation. I never shall forget the force with which, before I was well acquainted with Dr. Bridges, an assertion of Leidy one day struck me. Leidy said, he thought he had as much broad and general knowledge and accurate learning as could be found among us, and that he was a man of most sound and solid judgment. This I have found to grow upon my convictions of his mind and acquirements for the period of thirty-three years since Leidy spoke of him so sincerely and soundly."

His knowledge of natural history in general was extensive, accurate and always at command. He was a well-informed botanist, thoroughly versed in materia medica and chemistry, and a skillful practitioner of medicine. Naturally modest, almost shy, his manner to strangers was somewhat reserved, but cordial with his friends, all of whom regarded

him with affectionate respect, because they recognized his perfect integrity, sincerity, extensive learning and good sense.

In the annual oration before the Alumni Association of the Philadelphia College of Pharmacy, March 13th, 1882, Prof. Frederick B. Power spoke of him as follows:

"I cannot refrain from adding my tribute to the memory of him whose loss we have so recently been called upon to mourn—the late Professor Dr. Robert Bridges. His faithful teachings during an unparalleled period of service of nearly forty years will long be held in grateful remembrance by those who were permitted to listen to his instructions, while his generous and noble nature, so beautiful in its simplicity, so approachable and free from ostentation, had endowed him with attributes well worthy of emulation, and endeared him to his pupils by ties of affection which will be ever fondly cherished."

In his valedictory address to the graduates of the college, March 15th, 1882, Professor Samuel P. Sadtler said:

"The Philadelphia College of Pharmacy has just lost, in the death of Professor Robert Bridges, her Emeritus Professor of Chemistry, one, who, while he added much to her present substantial reputation, will be remembered and revered by those who knew him, chiefly because of his eminently loveable and unselfish character, his devotion to duty, and his faithful labors for the institution with which he was so long and so honorably connected. If we, younger men, and especially you, young gentlemen, just about starting upon your life's career, will emulate these qualities of character, we may expect some day, when the curtain drops upon the drama of our life, to have it said of each of us, as it is now said of him, 'his was a noble life.'"

ALCOHOL TABLES OF HEHNER AND OF PILE.

By A. B. Lyons, M. D., Detroit, Michigan.

Two voluminous alcoholometrical tables have recently been placed before the public, and more especially brought to the notice of pharmacists. The labor that has been expended in preparing them is evidence that their respective authors were convinced that they were rendering the world an important service, and this we are not disposed to question. It is in order, however, to discuss the absolute and relative merits of these rival tables. Impartial criticism may be of service in giving direction to any further work which may be undertaken in this field.

The first general observation to be made in regard to these tables is that for ordinary use they are quite too voluminous. Hehner's table occupies fourteen pages of a volume which should contain as little superfluous matter as possible. A table extending not beyond two pages would be much more convenient for reference, and might easily be constructed so as to comprehend more than the present table.

Pile's table, published in the February number of the "Journal of Pharmacy," is equally diffuse, coinciding indeed, line for line, with that of Hehner. The principle on which these tables are constructed is, in fact, radically vicious. A difference of ·0001 in specific gravity in a spirit containing eighteen per cent. (vol.) absolute alcohol will correspond to a difference of one-tenth of one per cent., nearly, in strength, whereas the same difference in specific gravity in a spirit containing ninety-nine per cent. of alcohol, will indicate a difference in strength only one-fifth as great. The second page of the Pharmacopœia table thus contains volume percentages, ranging from 9 to 23, while the thirteenth page, with the same number of figures covers only the interval between 93¼ and 97 per cent., and that, too, in a portion of the table which one has very rarely occasion to consult. One is reminded of a map drawn on Mercator's projection, on which the frozen polar regions are expanded out of all proportion to their importance.

The labor of interpolating values between those of the ordinary tables is in itself trifling, and it may be reduced to a minimum by adding a column of differences, or still better, a column containing the factor corresponding with a difference of ·0001 in specific gravity between consecutive terms, and for practical purposes, the necessary subtraction and multiplication could be made mentally, in less time than is now required to turn over the leaves in search of the required figure.

One important feature is conspicuously absent, which ought by all means to form a part of any complete alcoholometrical table. I refer to the temperature corrections which one has constantly to employ in practice.

These errors of redundancy and deficiency are common to both the tables. We come now to a comparison between them on the vital point of the relative and absolute accuracy of their figures. In general it may be said that in both Hehner's and Pile's tables, the mathematical computations have been performed with commendable precision. I have not had the time to examine all the figures, but it is

safe to say that they are nearly perfect in this regard. In the table of the Pharmacopœia, several misprints have escaped correction. I note the following: corresponding with sp. gr. ·9180, vol. per cent., 58·92 should be 57·92; sp. gr. ·8215, vol. per cent. 83·62 should read 93·62; sp. gr. ·8161, vol. per cent. 94·00 should read 95·00. But the error in each case is so obvious that it could rarely occasion mistake.

Pile distinctly states that he bases his table upon that of Tralles. It is easy to see that Hehner's, on the other hand, is merely an amplification of that of Fownes, with a few unimportant variations. The figures of the two tables differ materially, but not by any means so greatly as would appear from the tabulated comparison given by Mr. Pile ("Jour. of Pharmacy," February 1884, page 71). From these figures there would seem to be a difference between them amounting in some cases to more than one per cent. But it must be remembered that Hehner's table takes water at 60° F. as unity, while in Tralles' table, water at its maximum density is the standard adopted. Reducing the figures to a common standard, we shall find that the maximum difference, does not exceed one-fourth of one per cent. The corrected figures are as follows:

Specific Gravity.	Tralles.		Hehner.	
	Weight.	Volume.	Weight.	Volume.
·9991	0·00	0·00	0·00	0·00
·9857	8·05	10·00	8·22	10·22
·9751	16·29	20·00	16·47	20·25
·9646	24·69	30·00	24·78	30·14
·9510	33·39	40·00	33·55	40·23
·9335	42·52	50·00	42·60	50·14
·9126	52·19	60·00	52·04	59·88
·8892	62·50	70·00	62·36	69·92
·8631	73·59	80·00	73·43	79·91
·8332	85·75	90·00	85·67	90·01
·7939	100·00	100·00	99·73	99·83

Carrying the comparison through the whole of the two tables, I find the range of variation hardly greater than it appears in these selected figures. Such a variation, for ordinary purposes, is not of very great importance, although in tables which profess to discriminate differences

of one-tenth to one-fortieth of one per cent. we ought not to expect any such large margin.

According to Hehner (Fownes) the specific gravity of absolute alcohol is ·7938; according to Pile (Tralles) it is ·7939. Were the same unit adopted by the two authorities, these figures might be considered practically identical, but in fact the difference is ·0008, amounting to nearly one quarter of one per cent. Mr. Pile deliberately adopts his value as established beyond question, quoting a legal enactment of the United States as authority, which places the matter beyond dispute. He says: "Hehner began his tables by denoting the specific gravity of water as 1·000 at 60° F., but at the end of his table, we find absolute alcohol indicated by a specific gravity of ·7938, which is the case when compared with water as unity at 39° F., but when water is taken as unity at 60° F., as he began it should be represented by ·7946." This is pure assumption, and as we shall presently see is not correct, but to the author's mind the proposition is one capable of easy demonstration. A United States statute has established beyond controversy the true specific gravity of absolute alcohol. The following is the language of the statute: "Proof spirit shall be held and taken to be that alcoholic liquor which shall contain one-half its volume of alcohol of a specific gravity of ·7939 at 60° F. referred to water at its maximum density as unity." The statute is unfortunate in its wording, inasmuch as it does not specify at what temperature the liquid shall be measured, and it only implies that the "alcohol" described is an anhydrous spirit. The law defines what, legally, shall be called proof spirit; it does not fix the physical properties of the chemical compound, ethylic alcohol. That is something to be determined by actual observation: the law by which it was fixed is not written in any human statute book.

Dr. Squibb states that he has observed, repeatedly, in samples of absolute alcohol a specific gravity as low as ·7934 at 60°F., water at the same temperature being taken as standard. I do not find that any other observer confirms this statement; if it is true, none of our alcohol tables are quite correct, but that of Fownes, adopting the figure of Drinkwater (·79383), is in this particular nearest to the truth. I have not been able to confirm Dr. Squibb's statement, but I have never been satisfied that alcohol was completely dehydrated until its specific gravity was reduced to ·79385 at 60°F., water at the same temperature being standard, and a spirit of that strength can easily be

obtained by carefully following out the ordinary plan of dehydrating by means of quick lime.

If this is true, the *tables* are fairly turned on Mr. Pile, for it is his table, and not that of Hehner, which (practically) adopts "two different values to denote the specific gravity of water as a standard, one at the beginning and another at the end." We hasten to explain, however, that such a change of standard does not, after all, seriously affect the figures in the important portions of the table, and further, that all the alcohol tables in common use, except that of Fownes-Hehner, are open to criticism of the same kind.

Mr. Pile seems to regard the standard of pure alcohol, like that of a unit of weight or measure, as something dependent on conventional or legal definition. He says "alcohol having a specific gravity of ·8157 has been regarded as 95 per cent. alcohol for so long a time that it would seem to be difficult to interpret it in any other way, but by the adoption of the tables of Hehner it will have a specific gravity of ·8161, and so on." And again, "why not compile tables having Tralles as a basis, and thus keep in harmony with law and custom?" This evidently, would make the scientific correctness of an alcoholometrical table of no importance, and its whole value conventional. We must here take issue with him, taking the ground that no conventions can alter mathematical relations, or properties inherent in chemical compounds. The object of tables such as these is to furnish not only a uniform, but also a correct basis for the valuation of alcoholic liquors in commercial transactions, and a scientific truth is the only ground on which the figures of such a table can be criticized.

The question, therefore, between Tralles and Fownes, between Pile and Hehner, is wholly one for the experimental physicist to decide. I have myself examined somewhat closely the subject, and am convinced, not on *a priori* grounds, but from crucial experiments, that Tralles is more nearly correct in the main in his figures than Fownes, and hence I am glad that Mr. Pile has expended so much careful labor in expanding them, since Hehner had previously done the same service for the less worthy table of Fownes. I only regret that he did not go quite to the root of the matter, and furnish us with an original table more correct than either.

Fownes' table was adopted some years ago by Dr. Squibb as a basis, in part, of his very elaborate and valuable alcohol tables. His figures were placed side by side in those tables with those of Tralles, with no

attempt to reconcile their differences, but with a manifest disposition on the part of the writer to accept Fownes as the more trustworthy authority. The internal evidence does not support this view. When we examine the table in comparison with the others in common use, we are at once struck with the lawless irregularity of its intervals. That there exists any corresponding irregularity in the amount of condensation which takes place when alcohol and water are mixed in varying proportions, we cannot believe. That such cannot be the case is indeed capable of mathematical demonstration. Fownes' table was based directly upon synthetical experiments, which are said to have been very carefully conducted. Every alternate term in the table is the result of a direct determination, the remaining terms being then supplied by interpolation. The table is, in fact, simply a collection of independent observations, each subject to its own error, whereas in a completed table the errors are made to correct and neutralize one another by a process of equalization of intervals. Hehner's task was only imperfectly done, in that he made no attempt thus to idealize the table which he adopted as a foundation for his own. We cannot but hope that the next revision of the Pharmacopœia will contain an ideal alcohol table, at once more concise and more comprehensive than the present, more nearly correct in all its values than any that has yet been published, and that it shall not need to be a mere echo of some foreign "authority."

SORGHUM SUGAR.

By Oscar Houck, Ph.G.

From an Inaugural Essay.

The different kinds of sorghum (Sorghum saccharatum), now under cultivation in the United States, are varieties and hybrids from two main groups; the one the Chinese sugar cane, or sorgho, or sorghe, from China and India, and the second the African sugar cane, or imphee from the south of Africa. As varieties of the first group, we have the regular sorghum, Honduras cane, honey top, sprangle top, etc. Of the second group the most important are, the Liberian imphees, white African, white mammoth, Iowa red top and wolf's tail. As hybrids, the early amber is the most common, early orange and a number of others. These hybrids need, as also their names indicate, a

shorter time to attain maturity, and are therefore especially adapted for the more northern range, Wisconsin, Minnesota, etc., where the season is rather short; while the countries further south, with a longer season, have the advantage, that they can utilize both the early and late varieties, and thus be able to supply the mills for a longer time; besides that they also can utilize the other qualities, desirable in good cane, as saccharine richness, large percentage of juice, and large stalks. A rather sandy loam is said to be the most favorable soil for its cultivation.

The first seeds of the new sugar cane were brought to America in 1854, from France, where they had been imported from China only a few years previous. Not long afterwards also seeds of the African variety found their way over here. And now sorghum is to be found cultivated almost in all parts of the United States, where the climate is favorable to its growth; and it is said that where maize will thrive, sorghum also will.

Its principal use has, until lately, been confined to the mere production of syrup, as a very sweet, and to most persons, agreeable article of this kind may be prepared by means of quite inexpensive machinery. But the production of a cheap, marketable sugar from it, has, until the last three years, met with no success. Sugar has of course been produced from it long before this, but on account of inferior machinery and limited means it would not pay. It is also said that a fatty substance is contained in the juice of sorghum, which hindered the crystallization of the sugar, and necessitated another process than that used for the common sugar cane. The first sugar reported obtained from sorghum, was made by a farmer in Wisconsin (according to Prof. Carl Mohr). In 1858, J. S. Levering, a chemist of Philadelphia, received the gold medal from the United States Agricultural Society, as an acknowledgment for his successful and meritorious experiments in sugar making from sorghum ("Amer. Jour. Phar.," 1855, p. 182; 1858, p. 105). In spite of the publication of his process, no attempt was made to utilize it. Later, through the Commissioner of the Department of Agriculture at Washington, G. W. Le Duc, a great deal was done in order to arouse the interest for it, that new experiments should be undertaken. Steward, a Pennsylvania chemist, also treated the subject, and showed at the Centennial Exhibition, in 1876, samples of sugar which he had obtained by his experiments. With still greater energy Dr. Collier, chemist of the

Agricultural Department at Washington, took up the work, and of the results of his thorough investigations, he has given a minute account in his several reports, which has thrown much light on the subject.

At the same time, Prof. Swenson, of the University of Wisconsin, was occupied with investigations of the same kind, and when the United States government, through the Agricultural Department at Washington, offered a prize of $1,200 for the best method of treating sorghum cane, it was awarded to him.

Some New York capitalists, after having corresponded with Prof. Swenson and secured his service, determined to establish a sugar mill in some portion of the country, where the cane could be grown successfully and cheaply. The Arkansas river valley was decided upon, and in 1882 the mill was built at Hutchinson, Kansas. As an experiment some sugar was successfully made, already late, the same season. Last fall (1883), they made as an average 40 barrels of sugar and about 200 gallons of syrup a day. This was the first undertaking on a large scale, and as it proved a success, others have followed their example, and many more are likely to follow.

The process used in the above named mill I have not seen myself, but will give it as it has been described. The cane, having been examined by the chemist and found in the desirable ripe condition (when it contains most saccharose and least glucose), is cut, topped and hauled to the mill without stripping. Arrived there it is placed on a long endless belt, which acts as an elevator to carry it to the crusher, which consists of huge iron rollers. The cane is passed through this crusher at the rate of 25 tons per hour. The juice, as it runs from the rollers, passes into a large tank, from which it is pumped into the defecating room. Here it is run into six defecating pans, capable of holding three tons of juice each. In these are coils of copper tubing, through which steam is passed to heat the juice. To the lukewarm juice is then added milk of lime, until slightly alkaline, in order to neutralize the acids, which are always contained in it, and to coagulate the albuminous matter present. It is then heated as rapidly as possible to the boiling point, and the steam is shut off when the thick scum, which rises to the surface, begins to swell and break. After a few minutes the juice is skimmed, and it is again heated, this time to a quiet ebullition and again skimmed. This is repeated a few times, and the result is a very clear juice, almost free from sediment. From the defecating room the juice, containing 84 parts of water and 16 parts

of sugar, passes to the evaporating pans, where it is boiled down to 54 parts of water and 46 parts of sugar, when it is called "semi-syrup." This passes into a small vacuum pan, and from there into the bone-black filters. These are six in number, and are each cylindrical in shape, four feet in diameter and 20 feet high. Here the syrup is decolorized and deodorized, after which it is pumped into the large vacuum pan. This is ovoid in shape, made of boiler iron, and looks like a huge retort. It is seven feet in diameter, nine feet high, and will hold more than 1,000 gallons. In this the semi-syrup boils at 70° C. under diminished pressure, instead of 110° C. in free air. This is a great advantage, as it is a well-established fact that high heat and much exposure to the air quickens the conversion of sacharose into invert sugar. From the vacuum pan the syrup is put into large iron wagons, which hold about 250 gallons each, and in them is run into the crystallizing room. This room is kept at a temperature of 55° C., and in it the syrup is allowed to stand for several days until it crystallizes. The "melado," as the syrup at this stage is called, is then run into the mixer. This is a long bar with fingers attached, the whole revolving in an iron box. In this the melado is thoroughly mixed and made ready for the last process. From the mixer the melado is run into the centrifugals. These, four in number, are tubular vessels about three feet in length and two feet high, open above and closed below. Each is lined with fine copper sieve, a space of perhaps two or three inches intervening between the sieve and the outer wall of the centrifugal. The centrifugals are set in motion at the rate of 2,000 revolutions per minute, and the melado is run into them, falling upon a revolving disk in the centre. From this the melado is thrown with great force against the side of the vessel, striking upon the copper sieve, which is also in rapid revolution. The force of the projection throws the syrup through the sieve, while the crystallized sugar remains behind, whitening the longer it "spins," as the process is called. It is generally allowed to spin about fifteen minutes, after which the raw sugar is taken out and put into barrels, and the process is completed. Each centrifugal is capable of spinning 200 lbs. of sugar in those fifteen minutes. Besides these details, the process has, of course, its secrets, which are also kept as such.

From the above-named factory I obtained a sample of sugar, of which I made an analysis, which shortly will be explained. In appearance the sugar looks very much like the common raw sugar of com-

merce. But in odor and taste it differs somewhat, as it has retained some of that peculiar sorghum flavor, which is not disagreeable, and in which place in common raw sugar is found a taste and smell of burnt sugar.

In my analysis of the sorghum sugar I found the following constituents:

Saccharose	92·00 per cent.
Glucose	4·50 per cent.
Moisture	1·50 per cent.
Ash	1·10 per cent.
Impurities	0·90 per cent.
	100·00

The amount of saccharose was ascertained by the use of the Wilde polariscope, which as an average showed 92°. With the same instrument I examined samples of different sugars with the following results (The strength of the solutions was 10 grammes of sugar and water sufficient to make 100 cc.):

White rock candy polarized	100°
Yellow rock candy polarized	93°
Best granulated sugar polarized	99°
White A sugar polarized	94°
Common raw sugar polarized	84°
Sorghum sugar (4 experiments)	90°, 92°, 93°, 92°

Common raw sugar was also subjected to analysis for comparison:

Saccharose	84·00 per cent.
Glucose	11·80 per cent.
Moisture	2·50 per cent.
Ash	0·70 per cent.
Impurities	1·00 per cent.
	100·00

The moisture and ash of granulated sugar was also ascertained and found to be respectively 0·55 and 0·44 per cent. This shows in reference to the moisture, that the more glucose contained in the sugar, the more moisture is absorbed. As to the sorghum sugar the comparison is very satisfactory, as it contains eight per cent. more saccharose than the common raw sugar, and only two per cent. less than the A sugar, which has gone through a refining process. This very satisfactory result is due to the improved machinery of which the vacuum pan and the centrifugals are the most important, and without which the idea of sugar making, from sorghum, at the present sugar prices, might be given up as almost hopeless. But as it is, sorghum sugar can compete with other sugars, both in price and quality.

THE ALKALOIDS OF COPTIS TRIFOLIA.[1]

By John J. Schultz.

A Thesis Presented to the Cincinnati College of Pharmacy, Session 1883–84.

To find the proportion of alkaloids in Coptis trifolia, five pounds of carefully selected coptis, in moderately coarse powder, were moistened with officinal alcohol and packed firmly in a properly prepared cylindrical percolator. Officinal alcohol was then added in successive portions of two gallons each. The last portion was acidulated with four ounces of acetic acid. After each addition, maceration was conducted for twenty-four hours, and percolation was continued until the percolate finally passed almost colorless and devoid of any bitter taste.

Five gallons and five pints of percolate of a yellowish brown color and decidedly bitter taste were obtained. The dregs after having been removed from the percolator and dried at a temperature of 110°F., weighed four pounds and eight ounces, showing a loss of eight ounces.

To four and one-half pints of this percolate, representing eight ounces of drug, an excess of sulphuric acid was added and the mixture set aside in a cool place.

To one pint and two ounces of percolate, representing two ounces of drug, an excess of hydrochloric acid was added and the mixture set aside with the foregoing.

After standing forty-eight hours a precipitate had formed in each, that of the sulphuric acid being light yellow, while that of the hydrochloric acid was yellowish brown.

The supernatant liquids in each case were bitter and retained a decided yellow color, characteristic of berberine, showing that the precipitation of the berberine had been incomplete.

Two pints and four ounces of the original percolate, representing four ounces of drug, were then subjected to distillation, until the residue was of a syrupy consistence. The retort was then rinsed with eight ounces of water, the result placed in an evaporating dish, and the last traces of alcohol vaporized. A dark greenish fixed oil and a

[1] These experiments were carried on in the laboratory of Professor J. U. Lloyd, upon authentic specimens furnished by him. We take this opportunity to thank him for the attention shown us.

lighter colored resin began to separate as the alcohol evaporated, and these were completely precipitated by allowing the liquid to stand in a cool place for twenty-four hours. The contents of the dish were then thoroughly agitated with water and filtered. The filtrate was now evaporated to a syrupy consistence and eight ounces of alcohol added. This was divided into two equal portions, and one was strongly acidulated with sulphuric, the other with hydrochloric acid, and both set aside in a cool place.

After standing twenty-four hours, the portion acidulated with sulphuric acid had formed a considerable amount of a brownish yellow precipitate, but the supernatant liquid was still bitter and retained its yellow color. The portion acidulated with hydrochloric acid showed only a slight cloudiness, and did not precipitate even after standing for two weeks.

The foregoing processes are the ones usually employed for the separation of berberine, and neither, in these instances, gave a satisfactory result.

Through the courtesy of Professor J. U. Lloyd, we were enabled next to employ his scheme for the determination of berberine, as stated in the manuscript of his work upon "Drugs and Medicines of North America," and which is based upon the insolubility of picrate of berberine in most menstruums.

The first step was to separate the second alkaloid, discovered by Mr. E. Z. Gross, as follows: Of the remainder of the percolate, four gallons and one pint, representing four pounds of drug, were subjected to distillation, and the oil and resin separated in the manner heretofore described. To the resulting filtrate, officinal water of ammonia was added until slightly in excess. This produced a dark brown flocculent precipitate, which was collected on a filter and thoroughly washed with water. The filtrate, after having been slightly acidulated with sulphuric acid, and allowed to stand for several hours, was brought to an alkaline reaction by the addition of water of ammonia, when a second precipitation took place similar in appearance to the first. This and the foregoing precipitate after having been mixed and dried spontaneously, was treated with successive portions of chloroform. The chloroform was then distilled, and the residue exhausted with dilute sulphuric acid. The resulting solution when filtered and made alkaline by addition of ammonia water, gave a precipitate which when dried spontaneously, weighed 3·42 grains.

A portion of this precipitate when dissolved in water acidulated with acetic acid, gave precipitates with the following reagents for alkaloids: Platinic chloride, molybdate of ammonium, solution of iodine in iodide of potassium, and test solution of iodide of mercury and potassium.

A chloroformic solution of the remainder of this precipitate when evaporated on a slide formed microscopic crystals, but the quantity obtained was too small to admit of further investigation. (This was the second alkaloid as found by Mr. Gross.)

To a portion of the filtrate, from the foregoing precipitates, solution of carbonate of sodium was added without producing any precipitate, and it was positively shown that there was no more of this second alkaloid present.

To the entire filtrate and washings thus obtained from the second alkaloid, and which were of alkaline reaction, a solution of carbazotate of ammonium was now added. This produced a bulky yellow precipitate of carbazotate of berberine, which when collected on a filter and dried spontaneously, weighed 292·8 grains, corresponding to 228·03 grains of sulphate of berberine.

In order to test the filtrate for any remaining alkaloids, a portion was evaporated nearly to dryness on a water bath, and agitated successively with ether, chloroform, benzol and carbon disulphide.

The several solutions were evaporated, the residue dissolved in water and portions of it separately tested with test solution of iodide of mercury and potassium, molybdate of ammonium, and chloride of platinum, without producing any precipitate, thus showing the previous complete separation of all the alkaloids.

Recapitulation.—The foregoing experiments show, that Coptis trifolia yields to officinal alcohol, slightly acidulated with acetic acid, 10 per cent. of its weight of extractive matter. That it contains two alkaloids, as previously shown by the investigations of Mr. E. Z. Gross ("Am. Jour. Pharm.," 1873). That the berberine of Coptis trifolia is only partially separated by the processes usually employed for the determination of berberine. That it contains of berberine an amount equivalent to 0·8 per cent. of sulphate of berberine, or 57 grains of sulphate of berberine to the avoirdupois pound. That the amount of the second alkaloid is very small, 0·012 per cent., or only 0·855 grain to the avoirdupois pound having been obtained.

OLEUM GAULTHERIÆ.

By Isaac Edward Leonard, Ph.G.

Abstract from a Thesis.

Oil of wintergreen was first made in Luzerne county, Pa., in 1863, from which time it has been distilled in great quantities, with the exception of last year, when the yield was not so plentiful, owing to the destruction of the shrubberies by the fire which passed over our mountains.

In distilling, the entire overground portion of the plant is employed, which has its greatest yield during the months of July and August.

The still is generally a wooden box, about eight feet long, four feet wide, four feet high, with a copper bottom and staid with bolts. The head of the still is copper, and connecting with this is a square or circular worm of the same material or of tin, placed in a barrel. The still being filled with wintergreen to within about twelve inches of the top, a sufficient quantity of water is added, and this is allowed to macerate from ten to twelve hours. The fire being started, the distillation commences and continues for about eight hours; but during the first two or three hours, ninety per cent. of the oil has passed over. For collecting the distillate, most of the stillers use a wide mouth bottle or fruit jar, fitted with a large cork having two holes. A small tin or glass funnel is put into one of the holes, so that the beak of the funnel is below the shoulder of the receiving vessel, and connected with the other hole is a suitable pipe forming an egress. The distillate passes into the receiving vessel through the funnel. It is here that the oil and the water separates, the oil going to the bottom, and the water being lighter and in excess passes through the egress pipe into a larger receptacle, where it is reserved for a subsequent operation (cohobation).

Occasionally the oil is very highly colored. I have found several samples to contain traces of iron, which is due to the oxidation of the tin worm or can with which the oil comes in contact. Tin worms are used on account of their cheapness, but will only last about two weeks, before they undergo oxidation.

The wholesale dealers that handle the oil in large quantities have three ways of "cleaning" it, re-distillation, filtration, and decolorization. The first two processes are easily understood, while the decolor-

ization seems a difficult one, but is much easier than either of the others. The oil to be decolorized is put into a bottle and crystals of citric acid are added, the whole allowed to stand, agitating occasionally, until the oil is colorless, or nearly so.

On experimenting with nine quarts of wintergreen fruit, I found it contained one and one-half drachms of oil. The chief uses of the oil, are for flavoring and in printing fine calicoes.

In experimental distillation, I found that the lower specific gravity is due to the separating of the oil from the water too quickly, and that the higher specific gravity is obtained by letting the distillate stand from twenty-four to forty-eight hours before separating the oil from the water.

A case of poisoning occurred in 1883, at one of the grocery stores in White Haven, Pa. A man mistaking the oil for the milky water, drank about two ounces; he was taken to his home in Easton, Pa., and died in about five hours.

Parties have tried to export the oil, but did not succeed.

ON THE COMPOSITION OF OIL OF GAULTHERIA.

By Harlan P. Pettigrew, Ph.G.

From an Inaugural Essay.

The author gives a brief account of the investigations made by Prof. Procter on the oil of sweet birch ("Amer. Jour. Phar.," xv, p. 241), and of the information furnished by G. W. Kennedy (Ibid., 1882, p. 49), regarding its manufacture on a large scale and its sale in place of oil of gaultheria; and he refers to his chemical investigation of this oil (Ibid., 1883, p. 385) which showed it to be methyl salicylate. The first experiments on the chemical composition were made by Procter (Ibid., xiv, 211); afterward a fuller chemical investigation was made by Cahours (Ibid., xv, 241, from "Jour. de Phar. et de Chim.," May, 1843). To the latter is generally attributed the statement that this oil contains 10 per cent. of terpene; but in the French journal named no mention is made of a terpene, and the presence even of methyl alcohol was not conclusively proved, as the following abstract from that paper shows: "On treating this oil with a solution of potassa of 45°B., to which fragments of that alkali were added, and submitting the mixture to a regulated heat and distilling, a distillate was obtained

in the receiver which, after being treated several times with lime, furnished a liquid more volatile than water, and burning with a pale blue flame." The original papers on Salicylic Compounds, published by Cahours in "Annales de Chimie et de Physique" and in "Comptes Rendus," could not be consulted.

Two different specimens of oil of gaultheria were examined by the writer; one was obtained by Prof. Maisch, from Messrs. Underhill, Concord, N. H., and was distilled by them; the other was obtained directly from a distiller in Ellenville, N. Y., and both were guaranteed to be absolutely pure. These oils, when received, had already acquired a very slight reddish tinge, but upon re-distillation were obtained as bright, colorless and quite highly refractive liquids, having the specific gravity 1·17, both corresponding in this respect with the specific gravity of oil of wintergreen as determined by Procter.

The oils were treated separately, 190 grams being operated upon in each case. The plan followed in the investigation of this oil was the same as that adopted in the analysis of the oil of birch ("Amer. Jour. Phar.," 1883, p. 385), namely, saponification by treatment with a concentrated solution of potassium hydrate and boiling over a sand bath in a flask fitted with an inverted condenser. After complete decomposition of the oil, the contents of the flask were submitted to distillation upon a sand bath until the residue remaining in the flask was nearly dry. The distillate thus obtained presented a milky appearance, and globules of a yellowish oily substance were seen floating upon the surface. This is one striking difference between this oil and the oil of birch, as the corresponding distillate obtained from the latter was perfectly clear and transparent. The distillate was then agitated in the flask in which it was collected, with several successive portions of ether, and the etherial solutions were carefully separated from the aqueous liquid, and the ether recovered by distillation upon a water bath. The residue remaining in the flask then consisted (besides a few drops of water) of a yellowish oily substance, which was lighter than water and possessed a very strong peculiar odor entirely different from that of the oil of birch or wintergreen. The terpene was then weighed without any attempt being made to purify it, as the amount was small. This determination was only approximate, yet the amount of terpene found amounted to but 0·3 per cent. of the weight of the oil.

The aqueous liquid which remained after extracting the terpene by agitation with ether, and which contained the methyl alcohol, was per-

fectly clear and transparent, and the alcohol, which was obtained by repeated distillation of the liquid from a water bath, collecting only the lighter portions which passed over first, and further rectifying these by distilling from caustic lime, possessed the same odor, and was of the same specific gravity and boiling point as methyl alcohol.

The salicylic acid was obtained by making an aqueous solution of the salicylate of potassium, which remained in the flask after the first distillation, and decomposing this by the addition of a slight excess of hydrochloric acid, the chloride of potassium formed remaining in solution, while the salicylic acid formed as a dense white precipitate which, after washing with water and drying, was obtained pure by crystallizing from hot petroleum benzin.

Both specimens of oil examined yielded about the same amount of terpene, but as a portion of one of them was accidentally lost, no attempt was made to weigh the small amount remaining.

These results show that oil of gaultheria sp. gr. 1·17 does not contain 10 per cent. of a terpene; for, if it did, the specific gravity of the oil would necessarily be very much lower than that of the oil of birch, in which the absence of a terpene has been conclusively proved.

Whether the oil of gaultheria which has been distilled in the spring or summer contains more of the terpene than that distilled in the fall, is not known; but from results obtained by experiments made upon a specimen which was distilled in the spring, it seems that there is a difference, as this oil was found to have a specific gravity of but 1·0318, and the absence of alcohol was shown upon application of several of the tests for that substance.

After referring to Mr. Kennedy's paper read before the American Pharmaceutical Association (see "Amer. Jour. Phar.," 1883, p. 533; also 1883, p. 85), the writer continues: According to information upon this subject, obtained from a distiller of oil of gaultheria, the oil, which is seen floating in small globules upon the water will, if allowed to stand 24 hours, all collect together into large drops, and settle to the bottom of the containing vessel. This alone shows that this oil cannot consist of a hydrocarbon, but to decide the question conclusively, a small amount of water, which was taken from the receiver just as it came over from the still, was agitated with several successive portions of ether, the etherial solutions being carefully separated from the water, were evaporated, whereby only a very small amount of oil was obtained, which did not possess any odor of the terpene, and which con-

sisted only of the pure oil of gaultheria. This shows that the terpene does not become separated in the process of distillation.

The results of these investigations may be briefly summarized as follows:

I. Oil of birch is not identical with oil of gaultheria, in that it consists entirely of salicylate of methyl, and contains no terpene.

II. Oil of gaultheria, sp. gr. 1·17, does not contain ten per cent., but only a very small amount, of terpene, to the presence of which is due the slight difference in odor and specific gravity between the two oils.

SALICYLIC ACID AS A FOOD PRESERVATIVE.

Prof. Brouardel has recently published the conclusions of the Comité Consultatif d' Hygiène Publique on this subject.

He observes that, although the beneficial operation of salicylic acid in certain diseases is fully admitted, the theory of its action is very imperfectly understood. It is known, however, that when introduced into the economy it is eliminated by the kidneys and liver; and its warmest partisans admit that its use is contraindicated in the subjects of those diseases, which prevent its due elimination, and thus give rise to an accumulation that in several instances has proved fatal. Moreover, elimination is sometimes impeded from unknown causes in persons in whom the functions of these organs work healthily; while in aged persons it is always very slow. Under any circumstances, only a portion of the salicylic acid is eliminated, the remainder undergoing combinations in the tissues, which, although they may prove therapeutically useful, and even for a time produce no evil consequences, could not be indefinitely prolonged without mischief ensuing.

Even small doses of the salicylate may prove dangerous to persons who eliminate it imperfectly; and Prof. Brouardel's investigations during several years past lead him to believe that the number of such persons is largely on the increase. Since 1861 he has analyzed the urine of all patients entering his hospital service, and his registers show that the frequency of albuminuria has more than doubled during the last twenty years. Now, these patients are not all condemned to an early death, for many recover, and others live for many years; and when examples are adduced of young and robust persons tolerating the daily use of from four to six grammes of the solicylates for months

or years, we must not forget the aged persons and albuminurics, and individuals the subjects of various kinds of hepatic and renal disease, whose lives might be seriously compromised by such a regimen. The committee, therefore, believing that for such persons the daily use of salicylic acid would be highly dangerous, while even for those in good health there is no proof that it would be innocuous, recommend that its present prohibition should be maintained.—*Medical Times and Gazette*, Feb. 16, 1884; *Amer. Jour. Med. Sciences*, April.

TIN IN CANNED FOODS.[1]

By Professor Attfield, F.R.S., Etc.

From time to time, during the past twelve years, paragraphs have appeared in newspapers and other periodicals tending in effect to warn the public at least against the indiscriminate use of canned foods. And whenever there has been any foundation in fact for such cautions, it has commonly rested on the alleged presence and harmfulness of tin in the food. At the worst the amount of tin present has been absurdly small, affording an opportunity for one literary representative of medicine to state that before a man could be seriously affected by the tin, even if it occurred in the form of a compound of the metal, he would have to consume at a meal ten pounds of the food containing the largest amount of tin ever detected.

But the greatest proportions of tin thus referred to are, according to my experiments, far beyond those ever likely to be actually present in the food itself in the form of a compound of tin; present, that is to say, on account of the action of the fluids or juices of the food on the tin of the can. Such action and such consequent solution of the tin, and consequent admixture of a possibly assimilable compound of tin with the food, in my opinion, never occurs to an extent which in relation to health has any significance whatever. The occurrence of tin, not as a compound, but as the metal itself, is, if possible, still less important.

During the last fifteen years I have frequently examined canned foods, not only with respect to the food itself as food, and to the process of canning, but with regard to the relation of the food to, or the influence if any of the metal of, the can itself. So lately as within

[1] Read at an Evening Meeting of the Pharmaceutical Society, March 5th, 1884.

the past two or three months I have examined sixteen varieties of canned food for metals, with the following results:

Name of article examined.	Decimal parts of a grain of tin (or other foreign metal) present in a quarter of a pound.
Salmon	none
Lobsters	none
Oysters	0·004
Sardines	none
Lobster paste	none
Salmon paste	none
Bloater paste	0·002
Potted beef	none
Potted tongue	none
Potted "strasbourg"	none
Potted ham	0·002
Luncheon tongue	0·003
Apricots	0·007
Pears	0·003
Tomatoes	0·007
Peaches	0·004

These proportions of metal are, I say, undeserving of serious notice. I question whether they represent more than the amounts of tin we periodically wear off tin saucepans in preparing food—a month ago I found a trace of tin in water which had been boiled in a tin kettle—or the silver we wear off our forks and spoons. There can be little doubt that we annually pass through our systems a sensible amount of such metals, metallic compounds, and other substances that do not come under the denomination of food; but there is no evidence that they ever did or are ever likely to do harm or occasion us the slightest inconvenience. Harm is far more likely to come to us from noxious gases in the air we breathe than from foreign substances in the food we eat.

But whence come the much less minute amounts of tin—still harmless be it remembered—which have been stated to be occasionally present in canned foods? They come from the minute particles of metal chipped off from the tin sheets in the operations of cutting, bending or hammering the parts of the can, or possibly melted off in the operations necessary for the soldering together of the joints of the can. Some may, perhaps, be cut off by the knife in opening a can. At all events I not unfrequently find such minute particles of metal on care-

fully washing the external surfaces of a mass of meat just removed from a can, or on otherwise properly treating canned food with the object of detecting such particles. The published processes for the detection of tin in canned food will not reveal more than the amounts stated in the table, or about those amounts, that is to say, a few thousandths, or perhaps two or three hundredths of a grain, if this precaution be adopted. If such care be not observed the less minute amounts may be found. I did not detect any metallic particles in the twelve samples of canned food just mentioned, but during the past few years I have occasionally found small pieces of metal, perhaps amounting in some of the cases to a few tenths of a grain per pound. Now and then small shot-like pieces of tin, or possibly solder, may be met with. But no one has ever found, to my knowledge, such a quantity of actual metallic tin, tinned iron, or solder, as, from the point of view of health, can have any significance whatever.

The largest amount of tin I ever detected in actual solution in food was in some canned soup, containing a good deal of lemon juice. It amounted to only three-hundredths of a grain in a half pint of the soup as sent to table. Now, Christison says that quantities of 18 to 44 grains of the very soluble chloride of tin were required to kill dogs in from one to four days. Orfila says that several persons on one occasion dressed their dinner with chloride of tin, mistaking it for salt. One person would thus take not less than 20 to 30 grains of this soluble compound of tin. Yet only a little gastric and bowel disturbance followed, and from this all recovered in a few days. Pereira says that the dose of chloride of tin as an antispasmodic and stimulant is from $\frac{1}{16}$ to $\frac{1}{2}$ a grain repeated two or three times daily. Probably no article of canned food, not even the most acid fruit, if in a condition in which it can be eaten, has ever contained, in an ordinary table portion, as much of a soluble salt of tin as would amount to a harmless or useful medicinal dose.

Metallic particles of tin are without any effect on man. A thousand times the quantity ever found in a can of tinned food would do no harm.

Food as acid as, say ordinary pickles, would dissolve tin. Some manufacturers once purposed using tin stoppers to their bottles of pickles. But the tin was slowly dissolved by the acid of the vinegar. These pickles, however, had a distinctly nasty "metallic" flavor. The idea was abandoned. Probably any article of food containing enough

tin to disagree with the system would be too nasty to eat. Purchasers of food may rest assured that the action taken by this firm would be that usually followed. It is not to the interest of manufacturers or other vendors to offend the senses of purchasers, still less to do them actual harm; even if no higher motive comes into force.

In the early days of canning, it is just possible that the use of "spirits of salt" in soldering may have resulted in the presence of a little stannous, plumbous, or other chloride in canned food; but such a fault would soon be detected and corrected, and, as a matter of fact, rosin-soldering is to my knowledge more generally employed—indeed, for anything I know to the contrary, is exclusively employed—in canning food. Any rosin that gained access would be perfectly harmless. It is just possible, also, that formerly the tin itself may have contained lead, but I have not found any lead in the sheet tin used for canning of late years.

In conclusion: 1. I have never been able to satisfy myself that a can of ordinary tinned food contains even a useful medicinal dose of such a true soluble *compound* of tin as is likely to have any effect on man. 2. As for the metal itself, that is the filings or actual metallic particles or fragments, one ounce is a common dose as a vermifuge; harmless even in that quantity to man, and not always so harmful as could be desired to the parasites for whose disestablishment it is administered. One ounce might be contained in about four hundredweight of canned food. 3. If a possibly harmful quantity of a soluble compound of tin be placed in a portion of canned food, the latter will be so nasty and so unlike any ordinary nasty flavor, so "metallic," in fact, that no sane person will eat it. 4. Respecting the globules of solder (lead and tin) that are occasionally met with in canned food, I believe most persons detect them in the mouth and remove them, as they would shots in game. But if swallowed they do no harm. Pereira says that metallic lead is probably inert, and that nearly a quarter of a pound has been administered to a dog without any obvious effects. He goes on to say that as it becomes oxidized it occasionally acquires activity, quoting Paulini's statement that colic was produced in a patient who had swallowed a leaden bullet. To allay alarm in the minds of those who fear they might swallow pellets of solder, I may add that Pereira cites Proust for the assurance that an alloy of tin and lead is less easily oxidized than pure lead. 5. Unsoundness in meat does not appear to promote the corrosion or solution of tin. I have

kept salmon in cans till it was putrid, testing it occasionally for tin. No trace of tin was detected. Nevertheless, food should not be allowed to remain for a few days, or even hours, in saucepans, metal baking pans, or opened tins or cans, otherwise it *may* taste metallic. 6. Unsound food, canned or uncanned, may of course injure health, and where canned food really has done harm, the harm has in all probability been due to the food and not to the can. 7. What has been termed idiosyncrasy must also be borne in mind. I know a man to whom oatmeal is a poison. Some people cannot eat lobsters, either fresh or tinned. Serious results have followed the eating of not only oatmeal or shell-fish, but salmon and mutton; *hydrate* (misreported *nitrate*) of tin being gratuitously suggested as being contained in the salmon, in one case. Possibly there were cases of idiosyncrasy in the eater, possibly the food was unsound, possibly other causes altogether led to the results, but certainly, to my mind, the tin had nothing whatever to do with the matter.

In my opinion, given after well weighing all evidence hitherto forthcoming, the public have not the faintest cause for alarm respecting the occurrence of tin, lead, or any other metal in canned foods.—*Phar. Jour. and Trans.*, March 8th, 1884, p. 719.

SAPONIN FROM SAPONARIA OFFICINALIS.

By C. Schiaparelli.

The analyses hitherto made of saponin obtained from different plants are not very concordant, the results varying indeed from 47·52 per cent. C. and 7·16 H. (Overbeck) to 52·63 C. and 7·48 H. (Rochleder and Schwarz). Moreover the experiments of the last-named chemist lead to the conclusion that the carbohydrate obtained in the first instance from saponin by decomposition with acids, is not grape-sugar, but a body convertible into that sugar by the further action of acids,—and consequently that saponin is not a glucoside but an amyloid. To throw further light on this matter, the author has endeavored to determine whether the products extracted from different plants and included under the name of saponin, are really identical, and in the present paper he describes the results obtained with saponin from *Saponaria officinalis*.

The root of this plant, dried and coarsely pounded, was boiled for three days in a reflux apparatus with alcohol of 90°; after which the boiling alcoholic decoction was separated and left for some days in a

cool place, whereupon the sides of the vessel became coated with a copious yellow flocculent deposit which, when freed from coloring matter by treatment with a warm mixture of alcohol and ether, consisted of saponin, still, however, very impure. Treatment with alcohol and animal charcoal still left it contaminated with about 3 per cent. of mineral matter. It was, therefore dissolved in the smallest possible quantity of water; the cold solution was precipitated with saturated baryta-water; the resulting barium saponate, after washing with baryta-water, was suspended in water and decomposed by a current of carbonic anhydride, then heated to the boiling point, and filtered; the filtrate evaporated to a syrup at a gentle heat was precipitated with alcohol; and the still yellowish saponin was further purified with alcohol of 90 per cent. The substance thus obtained still contained barium salts, to remove which it was dissolved in water and treated with dilute sulphuric acid, added drop by drop; and the filtered liquid, after concentration at a gentle heat, was precipitated with alcohol and ether, these operations being repeated a second and a third time, and the product finally purified with boiling alcohol of 90 per cent. in quantity not sufficient to dissolve it completely. The alcoholic solution evaporated in a vacuum left perfectly white flocks of pure saponin, which were washed with ether and dried over sulphuric acid.

Saponin thus prepared gave, as the mean result of five analyses 52·65 per cent. carbon and 7·36 hydrogen, agreeing nearly with the formula $C_{32}H_{54}O_{18}$, which requires 52·86 C. and 7·44 H. Saponin from *Gypsophila* was found by Rochleder to contain 52·65 carbon and 7·34 hydrogen.

Pure saponin is a very white amorphous inodorous powder, which excites sneezing when inhaled by the nostrils; it has a pungent disagreeable taste, and is poisonous; dissolves very freely in water, but is insoluble in ether, benzene, and chloroform, and only slightly soluble in alcohol. Heated on platinum foil, it decomposes, emitting an odor of burnt sugar, and leaving a porous residue difficult to burn. Saponin is lævogyrate, like most glucosides; specific rotatory power $[\alpha]_o = -7·30$: it is the least optically active of all known glucosides.

Saponin, as already observed, is remarkable for the power of its aqueous solution to dissolve salts which are insoluble in water. When its aqueous solution, mixed with lead acetate, is precipitated by hydrogen sulphide and filtered the liquid which passes through is black from dissolved lead sulphide, which may be precipitated from it by adding

a small quantity of alcohol. A boiling aqueous solution of saponin dissolves barium carbonate (up to 10 per cent.), which may be precipitated by sulphuric acid; nevertheless barium sulphate is slightly soluble in aqueous saponin. This property of dissolving salts throws great difficulty, as already observed, in the way of purifying saponin. This substance likewise dissolves gases and incloses them mechanically. A dilute aqueous solution of saponin forms on agitation a very persistent froth.

An aqueous solution of saponin mixed with hydroxide of potassium, barium, or strontium, yields precipitates of the corresponding compounds. The barium compound has the composition—

$$C_{32}H_{53}O_{18}.BaC_{32}H_{52}O_{18}.BaC_{32}H_{53}O_{18}.$$

Products of Decomposition of Saponin.—An aqueous solution of saponin was heated on a water-bath with dilute sulphuric or hydrochloric acid, the liquid being filtered after two hours, in order to remove the flocculent substance which separated, and thereby prevent its further decomposition by the acid; the filtered solution was then again boiled, the new precipitate separated, and these operations were repeated a third time. The three precipitates thus obtained agreed very closely in composition, giving as the mean result of their analysis, 60·65 per cent. carbon and 8·22 hydrogen, numbers agreeing nearly with the formula $C_{40}H_{66}O_{18}$, which requires 61·06 carbon, 8·38 dydrogen, and 3·56 oxygen. The decomposition of saponin by dilute acids may therefore be represented by the equation

$$2C_{32}H_{54}O_{18} + 3H_2O = C_{40}H_{66}O_{15} + 4C_6H_{12}O_6.$$

The compound $C_{40}H_{66}O_{15}$ is called by the author saponetin, to distinguish it from the *sapogenin* of Rochleder and others, which was not of constant composition. Saponetin is a whitish microcrystalline substance, insoluble in water, alcohol, and ether,

The glucose formed by the action of dilute acids on saponin is dextrogyrate, its specific rotatory power being $[\alpha]_b = +52{\cdot}48$. It is fermentable, has a saccharine taste, and has not yet been crystallized, its solution, after concentration to a syrup, having remained for six months without giving any sign of crystallization. Further experiments are, however, required to determine whether it is a peculiar sugar distinct from dextrose, or whether the difference between its optical rotatory power and that of the latter is due to some other cause. —*Gazzetta*, xiii., 422–430; *Jour. Chem. Soc.*, March, 1884, p. 332.

SAPONIN FROM QUILLAIA.

By E. Stütz.

At the commencement of this paper, an historical account is given of saponin, a drug obtained from the *Saponaria rubra* and its allied species. The formulæ proposed for this substance, deduced from the percentage proportions of carbon and hydrogen found in it, are various, but most experimenters are agreed in proving that it is decomposed on boiling with acids, yielding a carbohydrate among other products.

The source of the saponin studied in this paper was the bark of the *Quillaja Saponaria*, a member of the Spireæa family, indigenous in Chili and Peru. This was digested with water, the extract evaporated down, and hot alcohol of 90 per cent. added; on cooling, white flocks of saponin separated, which were then frequently recrystallized from alcohol, and finally purified by animal charcoal.

Saponin thus obtained is a white, amorphous, neutral powder, generally possessing an astringent taste, due to traces of impurities; it is soluble in water, insoluble in absolute alcohol and ether; its aqueous solution forms a lather like soap. When heated to 195° it turns brown, and at a higher temperature evolves a vapor resembling caramel in odor.

The author was unable to obtain saponin free from inorganic impurities; and from the proportion of its barium compound it would appear probable that the impurities, principally consisting of calcium, were intimately associated with the saponin. From the mean of four concordant analyses the formula $C_{19}H_{30}O_{10}$ is deduced.

A concentrated aqueous solution of saponin is precipitated by baryta-water; a substance of composition $2C_{19}H_{30}O_{10}+Ba(OH)_2$ being formed, from which the barium is not readily separated by carbonic anhydride. In order to determine the number of alcoholic hydroxyl groupings present in saponin, it was heated with acetic or butyric anhydride under various conditions. A series of acetyl derivatives was thus obtained; amongst which are enumerated a tetracetyl, $C_{19}H_{26}\overline{Ac}_4O_{10}$, and a pentacetyl, $C_{19}H_{25}\overline{Ac}_5O_{10}$, derivative, and two compounds formed by the addition of acetic anhydride to the latter substances, viz., $C_{19}H_{25}\overline{Ac}_5.O_9(O\overline{Ac})_2$, and $C_{19}H_{23}\overline{Ac}_5O_8(O\overline{Ac})_4$. From these results it follows that the saponin contains five hydroxyl groups, and two oxy-

gen atoms combined only with carbon; its constitutional formula will thus be: $C_{19}H_{25}(OH)_5.O_2.O_3$. From the acetyl derivatives saponin can be regenerated.—*Jour. Chem. Soc.*, April, 1884, p. 463, from *Annalen*, vol. 218.

ACONITE ROOT.

By E. R. Squibb, M.D.

The description of the Pharmacopœia applies very well indeed to some parcels of Aconite root, but there are few drugs which, while retaining a general form, vary more in size, color and thickness of bark, in different parcels met with in the markets. The roots in the same parcel vary very much also in size, surface, and internal structure. Many roots in every parcel will not be over 1 to 1½ inches in length, and while a large proportion are very much wrinkled longitudinally, a few are quite smooth. These smooth roots are absent entirely from some parcels, and are not very numerous in any. They break with a solid, starchy fracture, and commonly have a very thin bark. The wrinkled roots are more spongy internally, and some are very light and porous, doubtless from having been in a very succulent condition when gathered. All these varieties may be very strong or very feeble to the taste, for the appearance bears very little relation to the activity of the root. Some parcels are much more stalky than others; that is, have more of the comparatively inert stalk cut off with the root, and in this are of course objectionable, yet many parcels that are quite stalky are to be preferred to those which are better trimmed, on account of superior activity. The greatest difference, however, in different bales is in the taste, or rather in the aconite impression upon the tongue and lips, and upon this the writer has long relied in selecting for purchase. Some years ago he published the method of testing by taste, and at that time stated that, with care in selection, parcels could be had which when each root of a handful sample was broken in the middle, and a very small piece from the point of fracture was chewed between the front teeth in contact with the tip of the tongue for a few moments, and was then discharged, eight out of ten of the roots would give the characteristic aconite tingling in some degree within ten or fifteen minutes. He can now state that parcels are easily had, though at a higher price, every root of which will give a strong sensation from a very small particle. This has made him revise the test within the past two years. As it comes from shipboard, or from storehouses, it

is commonly tough enough to be cut across with a sharp knife without going to dust as it does when dry. A very thin slice cut across from the middle of the root will weigh about a centigramme, or a little over one-sixth of a grain. This, if cut in ten pieces of nearly equal size, each will weigh about a milligramme, or the sixty-fifth of a grain. One of such pieces, taken between the front teeth and chewed in contact with the tip of the tongue with saliva enough to wet it, for about one minute, should give the aconite impression, not strongly, and not amounting to tingling, but yet a distinct impression which, when realized a few times, will always be recognized. There is no need of this cutting and weighing more than once, and that only to see how small a piece to take for the test, and there is a great advantage in taking so very small a piece, because the impression from it is so faint that it soon passes away, and admits of another root being tested in the same way in half an hour or so. If the piece be larger and the impression strong, it will last for two hours or more, and thus only a very few pieces can be tested in a day. At best it is a slow process, but well worth applying in the interest of accurate medication by a drug so important. Few pharmacists or physicians ever see the root, but only get the powdered root. The powder should be tested in the same way, taking about the same quantity on the tip of the tongue, and bruising and softening it with the teeth so as to get out the active principle.

Aconite root is not sweetish as described by the Pharmacopœia but is distinctly bitterish, but the taste proper is always faint. Some roots are tasteless, or so nearly so that no very distinct taste is recognized, and yet such roots may in a few minutes give a very decided impression.—*Ephemeris*, March, 1884, p. 502.

Artificial Food for Children.—There has been great discussion as to the qualifications of condensed milk as a substitute for the human article. Some men strongly advocate its use, while others bitterly condemn it. After reporting a case of infantile scurvy, in a foreign exchange, Dr. Edmund Owen says:

"The opinion which I have been compelled to form in my work in the out-patient rooms of the Children's Hospital, is that the worst nourished of the hand-fed infants are those that have been reared upon condensed milk and the various patent food stuffs; and that whenever an infant cannot have human breast-milk, the best substitute will be found in fresh cow's milk prepared and administered *secundum artem.*—*Med. and Surg. Rep.*, March 29, 1884.

THE ESTIMATION OF THE ALKALOIDS IN THE ROOT OF ATROPA BELADONNA.

By Wyndham R. Dunstan,

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F. Ransom.

Many methods have been proposed for the estimation of the alkaloids which exist in *Atropa Belladonna*. The majority of these methods involve the use of solvents which extract large quantities of non-alkaloidal organic substances, and thus necessitate the subsequent use of other solvents and precipitants to purify and isolate the alkaloid. A great advance was made by Pesci (*Gazzetta di Chimica Italiana*, x, 425), when he showed that the alkaloid could be extracted in a comparatively pure state by benzene from an aqueous extract of belladonna after the addition of an alkali. The benzene was then agitated with dilute sulphuric acid, which was subsequently rendered alkaline with ammonia and the alkaloid removed by chloroform. Pesci's method of extraction, although a great improvement upon older methods, was still far from perfect, and obviously could not be easily applied for the estimation of the alkaloid. In a previous paper[1] one of us has proposed a new method in plant analysis where a body soluble in chloroform has to be isolated. This method was based upon the general principle that in plant analysis that solvent should be selected for the estimation of the active constituent which extracts this constituent with the smallest quantity of the other constituents, thus rendering unnecessary long processes of subsequent purification.

There are many solvents which can be used for this purpose, solvents which easily dissolve alkaloids, glucosides, etc., but less readily dissolve coloring matter, acids, sugars, etc. Chloroform is one which often admits of use, but it was pointed out in the paper referred to that chloroform alone was ill-suited for completely extracting the plant tissues, owing to its weak, penetrating power. It was also proved in the special instance of nux vomica that this difficulty could be overcome by the admixture of alcohol with the chloroform; that is to say, while chloroform alone was incapable of extracting the whole of the

[1] Dunstan and Short, "The Assay of Nux Vomica" "Pharm. Jour.," [3], xiii, 665; "Amer. Jour. Phar.," 1883, p. 268.

alkaloid from nux vomica, when mixed with 25 per cent. of alcohol it was able to do so thoroughly and completely, leaving behind the whole of the mucilaginous constituents of the seeds and the other non-alkaloidal constituents, many of which would be extracted if alcohol alone were used. In the present paper we have extended this method of extraction with the chloroform-alcohol mixture to the isolation of the atropine and hyoscyamine existing in the root of *Atropa Belladonna*.

In preliminary experiments 10 grams of very finely powdered belladonna root were extracted with chloroform alone in a Dunstan and Short's extraction apparatus. The operation continued for three hours, during which time the root had been percolated twenty successive times with 50 cubic centimetres of boiling chloroform. The percolate, which had a light brown color, contained much alkaloid when the residue was tested with phosphotungstic acid. The marc was mixed with lime and boiled with alcohol. The alcoholic residue also gave evidence of containing abundance of alkaloid when tested with phosphotungstic acid and also by its action upon the pupil of the eye. Thus the chloroform had not completely exhausted the root of alkaloid; the experiment was again repeated, the chloroform being allowed to act for a longer time, but yet the marc contained considerably more than traces of alkaloid. The same quantity of finely powdered belladonna root was now acted upon by a mixture of equal parts of chloroform and absolute alcohol under precisely the same conditions. The percolate contained much alkaloid, but no trace could be detected in the remaining marc. This experiment was likewise repeated several times with the same result. It was thus evident that just as chloroform alone had been shown to be an inefficient extractive agent for nux vomica it was now shown that the same obtains with belladonna, and similarly as a mixture of chloroform and alcohol was an excellent solvent for the nux vomica alkaloids, so the same mixture was an equally good solvent for the alkaloidal salts in belladonna. The next experiments were made with different proportions of chloroform and alcohol. A mixture of chloroform with 25 per cent. of alcohol occupied too long a time in accomplishing complete exhaustion to allow it to be made the basis of an easy process for general use. The best results were obtained with a mixture of equal parts of chloroform and absolute alcohol, which consequently was used in further experiments. It was found necessary to use absolute alcohol on account of the action of the water contained in rectified spirit upon the belladonna, which

by causing swelling of the root and consequent clogging of the apparatus, seriously impeded the progress of percolation.

In these experiments the root was exhausted at the boiling point of the solvent (60° — 80° C.). Experiments were now made to see whether belladonna could be efficiently exhausted by a mixture of equal parts of chloroform and alcohol without the aid of heat; but it was found that after percolating 10 grams of the finely powdered root with 150 cubic centimetres of the mixture the marc still contained a large amount of alkaloid, and it was evident that a great quantity of the solvent would be required for complete exhaustion. This, although not an insuperable objection is a practical disadvantage, and having found that the belladonna root could be so well exhausted by the boiling solvent, we at once proceeded to examine the effect of a boiling mixture of chloroform and alcohol upon atropine under the conditions of our experiments, and so to discover whether the alkaloid would be injuriously affected at the boiling point of the mixture. Pure atropine was boiled for six hours in an apparatus with an upright condenser with a mixture of alcohol and chloroform. The mixture was then agitated with dilute sulphuric acid and the alkaloid recovered from the acid liquid, after the addition of ammonia, by chloroform. The following results were obtained:

	Atropine taken.	Atropine found.
a	0·085	0·084
β	0·221	0·217
γ	0·199	0.197
δ	0·213	0·208

The small differences in these figures are obviously accounted for by experimental errors, and the results, taken in conjunction with the fact that the residues were normally crystalline, prove that atropine is not decomposed or chemically altered even when exposed for six hours at the boiling point of the solvent which is proposed for use. We were now able to proceed further in developing the process. The belladonna root was now able to be exhausted with a boiling mixture of chloroform and alcohol, and it now remained to isolate the alkaloid in a pure state from the solvent. Dilute acids were at first used for this purpose, but it was afterwards discovered that the whole of the alkaloid could be withdrawn from the chloroform-alcohol mixture by merely agitating with water; two successive treatments with water in this way sufficed to remove every trace of the alkaloids from the

chloroform-alcohol mixture. The separation of the water from the mixture is instantaneous and entire if the mixture is gently warmed; nearly the whole of the coloring matter remains dissolved in the chloroform, whilst the water retains the alcohol and the alkaloidal salts. By rendering the aqueous solution alkaline with ammonia and agitating with chloroform the atropine and hyoscyamine were obtained after evaporation in an apparently pure state; that is to say, the residue was entirely soluble in dilute acids, and when dissolved in chloroform and the solvent spontaneously evaporated the alkaloid remained as a mass of white silky crystals. However, one of the most important points to be demonstrated in such investigations as these is the perfect purity of the final alkaloidal residue, and yet this is a point which is generally assumed and not proved by workers in this field.

On a previous occasion[1] one of us has proposed a method for ascertaining the purity of residues of strychnine and brucine, which is founded upon the complete precipitation of these alkaloids (when nearly free from other organic substances) by a solution of tannin rendered faintly alkaline with ammonia. This process was tried with atropine and hyoscyamine, but with negative results, for the precipitate at first formed was soluble in excess of the reagent. Other reagents were now experimented with. Potassium mercuric iodide was found to be by no means a complete precipitant of atropine, and is useless for its detection when present in small quantity. Picric acid is also useless alike for the detection and estimation of atropine; even when considerable quantities of the alkaloid are present in solution this reagent fails to afford any indication. Phosphotungstic and phosphomolybdic acids are far more delicate than the former reagents, but even these are not sufficiently exact for quantitative use. As far as the detection of atropine and hyoscyamine is concerned a very delicate test is the dilating action upon the eye's pupil which is distinctly yielded by mere traces of the alkaloids. After attempting the quantitative application of many of the alkaloid precipitants with no success, we found one reagent which is admirably adapted for quantitative use. A solution of iodine in potassium iodide completely precipitates even traces of atropine and hyoscyamine, from a solution in dilute hydrochloric acid, as the dark green periodides. When other acids are present the precipitation is not quite so complete. After a great number

[1] Dunstan and Short, "The Analysis of some Authentic Specimens of Nux Vomica" ("Pharm. Jour.," [3], xiii, 1053).

of experiments had been made with this reagent, and also in reference to the decomposition of the periodides, we devised the following method for estimating the purity of residues of atropine and hyoscyamine. The alkaloidal residue is dissolved in dilute hydrochloric acid and to this liquid is added excess of a strong solution of iodine in potassium iodide. The precipitate which at once agglomerates is filtered off, slightly washed with the solution of iodine and decomposed upon the filter with a solution of sodium thiosulphate, when it entirely dissolves, forming a colorless liquid from which the alkaloid is removed by agitation with chloroform. This process gave very satisfactory results with pure atropine, and the following results were obtained with the alkaloidal residues obtained in our experiments:

	Residue taken.	Pure alkaloid found.
1	0·020	0·0185
2	0·019	0·0175
3	0·078	0·079
4	0·078	0·076

These figures indicate that the final residue of alkaloid obtained from belladonna root by the process which we have described consists of pure alkaloid. It should be noted that both atropine and hyoscyamine are much affected by prolonged exposure at 100° C., becoming sensibly darker in color. The residues of alkaloid obtained in the process, and which usually weigh rather less than 0·1 gram, are light yellow in color and have a fused appearance; crystals of the alkaloids may be obtained by redissolving in chloroform and spontaneously evaporating, when silky needles will remain if the chloroform was free from water. The following is a detailed description of the process which we propose for the estimation of the atropine and hyoscyamine in belladonna root. Twenty grams of the dry and finely powdered root are exhausted by hot percolation with a mixture of equal parts by volume of chloroform and absolute alcohol; if an extraction apparatus is used about 60 cc. of the mixture is required. The percolate is agitated with two successive 25 cc. of distilled water, which are separated in the usual way. These are mixed and well agitated with chloroform to remove the last traces of mechanically adherent coloring matter. The chloroform is separated, the aqueous liquid rendered alkaline with ammonia and agitated with two successive 25 cc. of chloroform, which are separated, mixed and agitated with a small quantity of water (rendered faintly alkaline with ammonia) to remove

adherent aqueous liquid. The chloroform is then evaporated over a water-bath until the weight of the atropine and hyoscyamine is constant, which usually occupies a little less than one hour.

The special features which distinguish this process are, (1) it is simple and accurate; (2) a high temperature is avoided; (3) the solvent employed extracts a minimum of non-alkaloidal constituents; (4) no precipitants are used; (5) the use of acids is avoided; (6) the alkaloids are not heated with alkalies.

The root of *Atropa belladonna* grown at Hitchin and carefully dried at 100° F. yielded 0·38 per cent. of total alkaloid (atropine and hyoscyamine) when estimated by this process. Other specimens estimated in the same way yielded 0·39 per cent. and 0·35 per cent. of total alkaloid.

The work connected with this investigation has been aided by a grant from the Research Fund of the British Pharmaceutical Conference. In a future communication we propose to show how this process can be applied to the estimation of the atropine and hyoscyamine in other parts of the plant.—*Pharm. Jour. and Transactions*, February 9, 1884, p. 623.

NOTES ON TINCTURE OF HYOSCYAMUS.[1]

By William Gilmour.

Some time ago I had a sample of tincture of hyoscyamus given me to examine, which had a peculiar odor not at all characteristic of this tincture, and which also gave on the addition of water a milkiness much more decided than anything I had ever previously observed with hyoscyamus. It is sometimes not easy to distinguish a familiar odor if cunningly masked, but here there was little difficulty, particularly on diluting the tincture with water, in discovering the all-pervading odor of balsam of copaivi, and the supposition was that the hyoscyamus leaves from which the tincture had been prepared were annual leaves and had been sophisticated with the balsam so as to give the heavy odor and the milky opacity on the addition of water, characteristic of a tincture prepared from the biennial leaves. The idea was an ingenious one, particularly if we bear in mind that the annual hyoscy-

[1] Read at an Evening Meeting of the North British Branch of the Pharmaceutical Society, March 19, 1884.

amus can at present be bought for as many pence as the biennial costs shillings. Unfortunately for the idea, the contamination was ultimately discovered to be accidental, but to this accident you are indebted for the following short notes.

There have been only two methods proposed, so far as I am aware, to distinguish a tincture prepared from the annual henbane leaves from one prepared as officially directed from the biennial, namely, that of the spectroscope, by the late Mr. Stoddart, and that of a milky opacity on the addition of water, by Mr. Donovan.

In the "Medical Press and Circular," of 1871, Mr. Donovan directs "a little of the tincture to be added to a glass of water, when if the mixture becomes slightly milky the tincture (he states) is made from a two years old plant, but if it remain transparent the plant has been in its first year." Regarding the first mentioned test, Mr. Stoddart (in vol. xi, [2], "Pharmaceutical Journal," 1869–1870), after describing the spectrum of the biennial tincture, which gives four very dark bands, goes on to remark of the tincture prepared from the annual plant, "This spectrum is very different to the last and cannot be mistaken for it. The chlorophyll line at B is not so decided, the second and third lines so weak as to be barely visible and the fourth absent." A year later, writing in the same journal on Bristol Pharmacology, he puts the statement even more strongly, thus: "Authors have been undecided as to whether the biennial and annual plants should be regarded as distinct varieties, or the latter only a more mature growth of the former. The latter is probably the true state of the case. . . . The microspectroscope will immediately decide whether the tincture has been made from the biennial plant. Five dark bands are distinctly seen which are not visible in that from the annual." Both tests, I may state, have been repeatedly quoted since as authoritative. Thus, so recently as vol. viii of the present series, we have the writer of the month article, in the "Pharmaceutical Journal," making reference to both and saying that "practical pharmacists should not forget that the tincture of this plant (annual) does not show a milkiness when mixed with water, as that made from the biennial does, nor that the preparation made from the two kinds can be distinguished, as shown by Stoddart, by means of the spectroscope." Now it is not easy for investigators to arrive at any definite conclusion as to what is meant *commercially* by annual henbane, I find that the term applies indiscriminately to leaves derived from a variety of sources. Thus we have the British

annual henbane proper; and the root leaves of the biennial plant, which Mr. Holmes informs me usually forms the annual of English commerce; then there is what is known as German henbane, and probably a whole variety known somewhat vaguely as exotic henbane. Through the kindness and courtesy of Mr. Holmes, of the Museum department of the Society in London, I received samples of different kinds of henbane (samples of these as well as tinctures prepared from them are on the table and may be examined by members), and among others, one sample of the real German annual. I am persuaded, after comparing somewhat minutely this sample with those of the commercial received by favor from various wholesale houses, that very much of the annual henbane at present in circulation is of German origin. Be this as it may, what we, as practical pharmacists, have to do is to accept and judge matters as we actually find them, and, therefore, I have to point out that of all the annual specimens which I have examined, I have not found one which did not give a spectrum as well defined as that derived from any specimen of the biennial plant. Indeed, I have found the bands of the spectrum more uniform and and more decided from the various specimens of the annual plant which I have examined, than I have found from an equal number of specimens of the biennial plant. We must, therefore, once for all give up the spectroscope as an agent for distinguishing the one from the other.

It is probably not in the power of every one to apply a spectroscope to his tincture, but I will here shortly describe how a rough but very fair test may be applied to this tincture, showing its age, quality, etc., without going to the expense of a spectroscope.

To two parts of tincture in a test tube, add one part ordinary commercial benzole; shake thoroughly and allow to stand for a short time. The benzole will be found to separate, taking with it almost every particle of green coloring matter, leaving after a time a clear tincture beneath. So thoroughly does the benzole extract the chlorophyll that it leaves scarcely a trace of a dark band in the tincture beneath, and from the depth of the green solution above as well as from the color of the brown tincture below as good an indication will be given of the value of the tincture as can be got almost from the spectroscope itself. I have here a whole series of test tubes filled with tinctures thus treated, and, as can be seen at once, the shades of color vary considerably, both in the chlorophyll solution above and in the tincture beneath.

The history of these different tinctures will be referred to immediately, but I would in the meantime call attention to test tube numbered 3, which contains the tincture of German annual received from Mr. Holmes and which you will find not the least marked both as regards the chlorophyll solution above and the brown tincture beneath. So much for the spectroscope as discriminating between a tincture prepared from the annual and biennial plants.

Coming now to the other test, namely, that of the milky opacity on the addition of water, I have not found one single sample of bien nial which failed to give it, nor can I recollect of ever coming across such a sample during the last eight or ten years in the ordinary course of business. I would, therefore, unhesitatingly reject as bad, owing to age, or from some defect in drying or from exposure, or other cause, any biennial plant the tincture from which failed to yield it. In saying this, however, I am saying all that can be said for this test. It is *not* a test which can distinguish the biennial tincture from the annual, for I have come across as many specimens of the latter which do give the milkiness as of those which fail to give it. Of those which give the milkiness, some give it at once, while others only give it after standing for some time. This last fact may be the reason why the reaction has not been more frequently observed. The tincture from the German annual, which we have here, for example, gives it readily and copiously, and, in every respect as well, answers all the tests of a good biennial specimen, with the exception of the odor. Probably most will have noticed the heavy fetid odor (not unlike ox-gall) which the biennial tincture gives on the addition of caustic potash. This peculiar odor is almost entirely wanting in every specimen of tincture prepared from the annual plant which I have examined, the odor being quite different, In this respect the sample of the annual on the table closely resembles the tincture prepared from the large stem leaves of the biennial sample received from Mr. Holmes. This sample makes a very inferior tincture and is not for a moment to be compared to the tincture prepared from the leafy tops received also from Mr. Holmes.

It was originally my intention to have confined my notes to the two points touched upon, but after proceeding with the examination of the different specimens placed at my disposal, my attention was directed to a paper read by Mr. Gerrard, at the last meeting of the Pharmaceutical Conference, on "The Odorous principle of Henbane Leaf." In a concluding note to this paper, in which Mr. Gerrard practically applies

his investigations to pharmacy, he points out not only what I have just shown as regards the turbidity test, but goes on also to deduce several conclusions from it which, according to my experience, will, I think, scarcely stand the test of experiment. He states, for example, that "many samples of tincture of henbane almost lose their property of becoming turbid with water; this is generally the result of age, for such a tincture will be found to have lost its original green color and changed to a brown with formation of the usual dark deposit. Thus deposition and disappearance of turbidity are simultaneous and proportionate. As to the nature of the deposit in the tincture, I believe if examined it will be found to consist of a mixture of odorous principle, fat and chlorophyll, the separation of which is slowly effected by the agency of the water in the proof spirit; if this be so, then it is an argument for the use of a stronger alcohol in the making of the tincture of henbane."

I called Mr. Gerrard's attention to the fact that I had exposed a tincture of henbane to ordinary light (no sunshine), and in three weeks it had lost almost every trace of green coloring principle, while it had not deposited in the least, nor had it lost its property of becoming turbid with water. To this Mr. Gerrard replied that the tincture had not been kept sufficiently long, but that with the changing of the chlorophyll the tincture would have become acid (it shows no signs of acidity up to the present time), this acidity increasing with age, and that the deposit referred to by him would take from three to six months to form. I believe Mr. Gerrard is quite right in his observations, although I think he is wrong in his deduction that this change "is slowly effected by the agency of the water in the proof spirit." Some years ago I pointed out that these very changes here described by Mr. Gerrard took place in olive oil on exposing it to light. There was the first gradual decomposition of the chlorophyll and the disappearance of the bands in the spectroscope; next an increasing cloudiness in the oil, accompanied by an increasing acidity, all of which, I have no doubt, would have ended in a deposit as described by Mr. Gerrard had the density of the oil permitted this, or had it been kept long enough. The water could scarcely in this instance be said to be the agent which either favored decomposition or tended to effect separation. But further and more important still, I have to point out the much greater susceptibility of a tincture of henbane to change when prepared with a stronger as compared with a weaker alcohol. I have

prepared duplicate tinctures with rectified spirit of every sample of henbane on the table, and two things cannot fail at once to strike even an ordinary observer regarding them, namely, first, the close resemblance which they all (annual and biennial) bear to each other, and, second, the striking unlikeness which they have to a tincture prepared from proof spirit. They have all the same deep green coloration, not unlike essence of bergamot, or better still, like commercial cajeput oil, and this characteristic feature, so striking in the first instance, is equally remarkable for its evanescence on exposure. I find that even twelve hours exposure will quite change their appearance, and this change goes on so rapidly that towards the end of a week the tincture becomes almost decolorized. I have here two tinctures thus exposed, which you can compare with samples of the same tincture carefully preserved. Twelve hours' exposure removed every trace of bright green, converting the tincture into a brown olive, and this in turn gradually faded, until it reached on the seventh day the dirty straw white which you now see. This you will admit is of itself a very serious objection to any change in the spirit strength of the tincture, more especially if we keep in mind, comparatively speaking, the permanent character (to the naked eye) of the official tincture, three weeks' exposure under similar conditions making scarcely any observable difference in it.

There is still one more objection to changing the spirit strength of this tincture, and to my mind it is the most serious of all, namely, that the stronger spirit does not exhaust the leaves of their active principle. In saying this I know that I am going not only in the face of Mr. Gerrard, but also of such an eminent authority as Christison, who says that the leaves impart their active principle alike to alcohol and proof spirit. From the very great change which has taken place in the rectified spirit tincture on exposure, as well as from the entire absence of any coloring principle except the chlorophyll when treated with benzole as already described (on agitating the rectified spirit tincture with water and benzole, the benzole extracts every particle of green coloring matter and leaves the tincture beneath absolutely colorless), I think there is every reason to conclude that the stronger alcohol exhausts the leaves to a very great extent of their green coloring matter and not to any extent of their active principle. In further proof of this I have to point out that with wonderful uniformity all the proof spirit tinctures contain from five to six times the amount of extractive matter

compared with the stronger spirit tinctures prepared from the same samples. The table underneath sufficiently explains itself.

No. 1. German annual, proof spt. = 1·05 per cent. extractive.
No. 2. German annual, rect. spt. = ·20 per cent. extractive.
No. 3. Large leaf biennial *ver.*, proof spt. = 1·40 per cent. extractive.
No. 4. Large leaf biennial *ver.*, rect. spt. ·20 per cent. extractive.
No. 5. Biennial tops *ver.*, proof spt. = 1·40 per cent. extractive.
No. 6. Biennial tops *ver.*, rect. spt. = ·20 per cent. extractive.
No. 7. Biennial commercial (1), proof spt. = 1·20 per cent. extractive.
No. 8. Biennial commercial, rect. spt. = ·21 per cent. extractive.
No. 9. Biennial commercial (2), proof spt. = 1·20 per cent. extractive.
No. 10. Biennial commercial, rect. spt. = ·5 per cent. extractive.

Of course extractive matter is not active principle, and the correct plan to determine the relative value of the two tinctures would be to estimate the amount of hyoscyamine present in them. I have been experimenting on quantities much too small to permit of this, and, moreover, it was not my intention, as I have already explained, to enter into the question of a stronger or a weaker tincture, so that I have not had time to do so, even although I had so desired.

To sum up my observations, we have:

First. The fact that the spectroscope does *not* distinguish between a tincture made from an annual or a biennial plant.

Second. That the milky turbidity on the addition of water is not a test to distinguish the one from the other; but it is a fairly good test as to the quality, as far as age, exposure, etc., of the biennial plant is concerned.

Third. That a proof spirit tincture, although quickly changing so far as the chlorophyll matter is concerned, does not show this change to any extent to the naked eye, while the more important chemical changes which ultimately affect the quality of the tincture therapeutically are comparatively slow.

Fourth. That a rectified spirit tincture undergoes very rapid changes, which are very conspicuous to the naked eye, and which are almost certain to end in rapid chemical changes affecting the therapeutic value (if it possesses any) of the tincture.

Fifth. That rectified spirit does not possess the same power of exhausting the henbane of its extractive matter as proof spirit.

Sixth. That a rectified spirit tincture and a proof spirit tincture are quite unlike in their appearance, so much so as practically to make them unrecognizable.—*Phar. Jour. Trans.*, March March, 29, 1884, p. 781.

KAIRINE AND KAIROLINE.

(HYDROXYQUINOLINEMETHYL HYDRIDE AND QUINOLINEMETHYL HYDRIDE.)

By Filehne.

The present paper treats of the physiological properties of these bodies. They are both, as well as some other compounds of the quinoline series, very powerful anti-pyretics, but have no local action, and are, therefore, valuable medicines in cases of fever. They are quite similar in action; kairoline is, however, less energetic and slower in action than kairine. Kairine has been tried in a series of acute and chronic febrile diseases, and in all, its antithermic action was found to be constant.

The hydrochloride is the salt employed; it is a clear crystalline greyish-yellow powder, very soluble in water, and has a bitter somewhat aromatic taste. After administering the powder, water should be drunk freely. Its use is not accompanied by any unpleasant effects, such as headache, ringing in the ears, sickness, etc. With regard to its antithermic properties, doses of 1 to 1·5 gram in healthy adults have no physiological action and no effect on the temperature; whilst in cases of adult patients or debilitated subjects, a dose of 1 gram every two hours must not be exceeded, otherwise cyanosis is apt to ensue. The most suitable dose in adult fever cases is 0·3 to 0·5 gram every hour or 1½ hour. The interval between 1 gram doses should not exceed 2½ hours, and that between 0·5 gram doses not more than 1½ to 2 hours, for the effect of 1 gram only lasts three hours, whilst that of 0·5 gram is of 2¼ hours' duration; to produce a less pronounced effect reduce the doses, but do not increase the interval. When the influence of the drug ceases, the temperature rises again with a feeling of chilliness amounting sometimes to actual rigor. Less than 0·3 gram given at once has no practical effect on the temperature, a dose of 0·3 to 1 gram lowers the temperature by ½ to 2°, another dose given before the effect of the former one passes away, causes a further reduction, and if 0·5 gram be given hourly, it invariably follows that, without any injurious effect, the temperature falls to the normal point or below it after the fourth (sometimes after the third, or even the second) dose. The temperature cannot be brought below 37 — 36·5°, and the low temperature is maintained only as long as the administration of the

drug is continued every 2½ hours at least, otherwise shivering occurs, and the temperature rises to the point corresponding to the acuteness of the disease; this drawback is overcome, so as not to disturb the night's rest, by judicious dosing during the day, and by giving a full dose of 2 grams of *kairoline* the last thing at night. The action of kairine begins 25 minutes after the dose of 0·5 to 1 gram is taken by the mouth; the fall in temperature is more rapid the larger the dose, and is always accompanied by profuse sweating, which lasts only as long as the temperature continues to fall. During the use of these drugs, the urine becomes green, but contains no sugar or albumin. Pneumonia patients especially have enjoyed great comfort from the use of this drug; in fact, such cases can be kept quite free of fever. It is suggested to use kairine as a remedy in malarial affections, by giving 1 gram hourly, three hours before the expected attacks.—*Phar. Jour. and Trans.* [3], 14, 383, 384; *Jour. Chem. Soc.*, April, 1884, p. 474.

VARIETIES.

PEPTONES IN THE URINE have recently ("Miss. Val. Med. Monthly") received considerable attention; some observers suppose their presence is of special clinical importance, indicating a morbid state analogous to, or possibly an early stage of granular contracted kidney. The elaborate investigation of Dr. R. W. Jaksch, however, tended to discredit this view. He found that peptones appeared in the urine with great frequency in cases where there was a considerable amount of suppuration from whatever cause, or where there was a large amount of exudation; he found it in every one of twenty cases of phthisis with purulent expectoration, and of five cases of epidemic cerebro-spinal meningitis, and twelve cases of acute rheumatism, as well as in twenty-four out of twenty-nine cases of croupous pneumonia. He believes that the peptonuria is due to the re absorption of the inflammatory products, and does not depend in any way on the condition of the kidneys.—*Weekly Med. Review*, March 15, 1884.

A CAUTION ABOUT JEQUIRITY.—After reporting a case of sloughing of the cornea after the use of jequirity, in the "Weekly Medical Review," February 23, 1884, Dr. S. Pollak formulates as follows:

1. Jequirity is by far the best remedy which has been hitherto used for trachoma and pannus.

2. It does all, and more speedily, that has ever been claimed for purulent inoculation, minus the repulsiveness of the last remedy.

3. The infusion of jequirity must be used only when perfectly fresh. After four or five days it swarms with bacteria, when the danger of their entering the tissue and causing a septic state is very great.

4. Sterilizing the infusion requires much care and labor, and may not always be practicable. It will doubtless retard the decomposition, but it will not prevent it entirely.

5. The full therapeutic utility of jequirity will only be attained when chemistry shall have succeeded in preparing an alkaloid of it, which will keep, and the strength of it is properly known.—*Med. and Surg. Rep.*, March 22.

Value of Ether and Chloroform.—Dr. J. W. Parkinson's conclusions are as follows: 1. That ether is as efficient an anæsthetic as chloroform. 2. That there are fewer cases in which its use is contra-indicated. 3. That it is a safer anæsthetic in the hands of the most experienced, and by inference corresponding in an increased ratio with those more or less unskilled. 4. That the use of chloroform with our present knowledge and experience, in preference to ether, where no contra-indication to the latter can be shown, is adding materially to the risk of the patient and the responsibility of the administrator.—*Pacif. Med. and Surg. Jour.*

Toxic Action of Copper.—It seems to grow more and more doubtful whether copper can be reckoned among the poisonous metals. Of course in large quantities it is noxious; but this is true of alcohol and of many other compounds which cannot fairly be considered as poisonous. The latest experiments tend to indicate that at any rate copper is not a cumulative poison, like lead. MM. Houlès and De Pietra Santa, in a recent communication addressed to the Académie des Sciences of Paris, report that they have been unable to discover any injurious action on the health of the workmen engaged in the copper industry, and have come to the conclusion that the so-called "*colique de cuivre*," asserted in the eighteenth century to be a definite disease, does not exist.—*Lancet; Louisv. Med. News.*, March 15.

Turpentine as a Prophylactic in Infectious Diseases.—The "Medical Record" tells us that H. Vilandt writes in the "Ugeskrift for Laeger," vol. viii, No. 8, 1883, concerning the value of the oil of turpentine in the treatment and prophylaxis of diphtheria and the exanthematous diseases. He states that he has never seen any of these diseases spread from a sick child to other members of the family when this remedy was employed. In many of his cases no isolation could be attempted, as the mother was the only female in the family, and was obliged to take care of both the sick and the well, continually passing back and forth from one to the other. His method was to pour from twenty to forty drops of a mixture of equal parts of turpentine and carbolic acid into a kettle of water, which was kept simmering over a slow fire, so that the air of the sick-room was kept constantly impregnated with the odor of these two substances. He claims also that by this means a favorable influence is exerted upon the exudation in diphtheria, although it is by no means curative of the disease, and should never be relied upon to the exclusion of other remedies.—*Med. and Surg. Rep.*, March 29, 1884.

CONVALLARIA MAJALIS is not as perfectly safe as some have believed. Dr. George Herschell relates in the "Lancet" the case of a man, apparently healthy, who had an irregular pulse following worry and overwork two years ago. The patient had been taking digitalis, but this was discontinued, and, after an interval of a month or two, tincture of convallaria was ordered in five minim doses three times a day. After a few doses he was obliged to stop its use on account of its remarkable effects. Almost immediately after taking a dose the pulse became nearly imperceptible at the wrist, and there was a sense of oppression over the sternum, nausea, cold feet, vertigo, flatulence, and a feeling of utter prostration. These symptoms lasted two hours, but came on again at each repetition of the dose.— *Weekly Med. Review*, Dec. 1, 1883.

RAPIDLY DRYING VARNISH.—W. Dauner recommends the following: Mix intimately colophony with thick milk of lime; after 24 hours dry by heat and powder. This powder is used for preparing varnishes from soft resins as follows: Melt 100 parts of pine resin, add with constant stirring 10 to 15 parts of the above powder, continue to heat for 30 minutes, remove from the fire and add linseed oil 25 to 50 parts and oil of turpentine 35 to 90 parts, according to the thickness desired.—*Hoffm. Papierzeitung.*

MINUTES OF THE COLLEGE.

PHILADELPHIA, March 31, 1884.

The annual meeting of the Philadelphia College of Pharmacy was held this day at the College Hall, No. 145 North Tenth street. The President called the meeting to order at 3.30 P. M. The registry showed 20 members in attendance.

The minutes of the last meeting were read, and, on motion, adopted.

Wm. C. Bakes, Secretary of the Board of Trustees, read the minutes of the Board for January, February and March, which were, on motion, approved.

From these minutes and others of the Board of Trustees during November, 1883, the College is informed that in accordance with its request the Board has elected a number of gentlemen Honorary and Corresponding Members, and that replies have been received from many of them acknowledging the receipt of the certificate of membership.

The names of the gentlemen elected are as follows, viz.:

Honorary Members.—Prof. John Attfield, London, England; Prof. G. Planchon, Paris, France; Prof. G. Dragendorff, Dorpat, Russia; Thomas Greenish, London, England; E. M. Holmes, London, England; Prof. H. Baillon, Paris, France; Dr. Hermann Hager, Pulvermühle, Fürstenberg, Germany; Dr. Oswald Hesse, Feuerbach, near Stuttgart, Germany; Prof. Edward Schaer, Zurich, Switzerland; Prof. Robert Bentley, London, England; Prof. A. Ladenburg, Kiel, Germany.

Corresponding Members.—H. P. Madsen, Copenhagen, Denmark; Prof. E. Reichardt, Jena, Germany; Bruno Hirsch, Frankfort on the Main, Germany; Edmund Van Melckebeke, Antwerp, Belgium; Ch. Tanret,

Paris, France; Charles Patrouillard, Gisors, France; Prof. C. Méhu, Paris, France; George F. Schacht, Clifton, England; A. W. Gerrard, London, England; Richard Reynolds, Leeds, England; Charles Symes, Liverpool, England; Prof. V. Podwissotzki, Dorpat, Russia; H. Bonnewyn, Ixelles, Belgium; D. A. Van Bastelaer, Marcinelle, Belgium.

Thomas S. Wiegand, Librarian, read his annual report, which was, on motion, adopted:

PHILADELPHIA, March 31, 1884.

The Librarian respectfully reports that there has been added to the library a number of new and valuable works, mostly scientific or pertaining directly to pharmacy; a number of volumes of theses have been bound, and most of the exchanges which we preserve have also been placed on our shelves; new shelving having been built, a better arrangement of the books is now possible.

The report of the Curator for the year was read by Mr. Zeller. It was, on motion, accepted, and the recommendations therein contained, were referred to the Board of Trustees for their consideration.

PHILADELPHIA, March 31, 1844.

To the President and Members of the Philadelphia College of Pharmacy:

The Curator desires to respectfully report that progress has been made in the arrangement of the cabinet. Since the erection of the new cases on the south side of the museum, many specimens that had accumulated from want of space have been cared for and arranged for exhibition. Most prominent among these is the collection from East India, numbering 94 handsome specimens in good condition; next in number are 91 samples of drugs from Japan, these, with the original collection shown at the Centennial Exhibition, gives an aggregate of 300 specimens representing Japanese Materia Medica. 54 specimens received from the Pharmaceutical Society of Great Britain, through Mr. Holmes, their Curator, have been given a prominent position, also 46 specimens of indigenous Mexican drugs received from the Academy of Natural Sciences of this city, through Dr. Ruschenberger. (This is a portion of the collection arranged by Prof. Herrera for the Mexican exhibit during the Centennial, and contains many rare and beautiful specimens.) A collection of 39 specimens which have been arranged, are interesting from the fact that they belonged to a lot from British Guiana and were exhibited in the Crystal Palace Exhibition in New York, in 1849. Seven fine samples of Cinchona barks, 33 Brazilian, and 30 California specimens, with a series of 18 bottles of Aniline colors, and 120 Chemical specimens from the Mallinckrodt Co., of St. Louis, in all 531 new specimens have been relabeled, rearranged, and are now ready for inspection. In order to facilitate the finding of specimens and to aid students in comparing the same, the plan of arranging them as much as practicable according to the order in which they are lectured upon has been adopted. Another feature introduced during the year was that of devoting a case for the reception of products (mostly pharmaceutical preparations) which were handed in by the students with their thesis; this exhibit seemed to be appreciated during the course just closed, and it will no doubt be the means of increasing the number of pharmaceutical specimens. The Cinchona, Opium and Eucalyptus collections have been rearranged and displayed in the most prominent places in a new case, and can now be studied to best advantage. Although the cases just built have given room adequate for the present number of specimens, it is respectfully suggested that more room be obtained for future additions, the shelf room not now in use is limited and will very likely soon be filled, the Curator respectfully recommends that a gallery be constructed over the present alcove cases during the coming summer; it is suggested that the work be done during

the coming months, as it would be impracticable during the College course. 2,350 specimens are now on exhibition.

Respectfully submitted,

CHAS. FRED'K ZELLER.

Henry N. Rittenhouse, Chairman of the Publishing Committee, read their report for the year, as follows, viz.:

PHILADELPHIA, March 31, 1883.

To the Officers and Members of the Philadelphia College of Pharmacy:

GENTLEMEN:—We herewith present our annual report of the work of the Publishing Committee of the College. We have the pleasure to state that the JOURNAL has been issued with its usual regularity and promptness during the past year; its character as a record of the progress of Pharmacy and allied Sciences has maintained the original purpose for which it was first issued.

The vast amount of Pharmaceutical Literature now published, and the low prices of subscription at which most of it is sold (no single journal costing as much as the "Am. Journal of Pharmacy"), is beginning to be felt in our list of subscribers, and during the past year we have lost a number of names.

Since the foundation of the JOURNAL in 1825, the conditions of Pharmaceutical Literature have experienced great changes; Steam and Electricity have manifested their influence in this as in other fields by rapidly disseminating scientific information, as soon as announced, by investigators, and the consequence is a multiplication of publications.

Twenty-seven years ago there was but one journal other than that of this College published in this country in the interests of Pharmacy; but in the past ten years the number has increased to quite ten times as many; most of these journals are published by their owners as a business venture, and are managed with all the energy and enterprise of modern business methods. Advertisement solicitors are numerous and successful, judging from the advertising pages of their issues, and they could well afford to give their journals away, as advertisers seem to be plentiful and rates remunerative. This condition of things, we think, is sufficient to fully account for the loss of a few of our subscribers in the past, and possibly, more in the future.

The reports of the Editor and Business Editor accompany this, and will give in detail the Literary and Financial accounts of the year.

HENRY N. RITTENHOUSE, *Chairman of Committee.*

The Editor's report concerning the publications in the JOURNAL is herewith presented. It is gratifying in some respects, especially wherein he states that an increasing interest has been manifested by members as shown by their more frequent contributions to the pages of the JOURNAL than for several years past, also in the number of papers read before the meetings of the College.

To the Philadelphia College of Pharmacy:

The Editor respectfully reports that during the past year ending with the month of March, 1884, there have been published in the JOURNAL 68 original papers, an increase of 11 over the preceding year. Of this number 11 were abstracts of theses, 27 were contributed by 14 members of the College, and 30 papers by 18 non-members. In this statement the editorials, reports, reviews, and similar original matter are not included; nor does it include the original translations and abstracts from foreign journals, of which during the past year Prof. Power contributed 6, and the Editor 11 papers. At the meetings of the College held during the past year 17 papers were read, of which number 11 were by members, and 6 by students of the College. The Editor is pleased to record the fact that a larger number of members have manifested their interest in the JOURNAL during the past year, and that a larger number of papers have been read at the meetings of the Col-

lege, than has been the case since the year 1879–1880; and he sincerely hopes that this increased interest may be contiuued.

Respectfully submitted,

JOHN M. MAISCH, *Editor.*

The Business Editor gives a complete detailed financial report of the management of the JOURNAL, showing a satisfactory result considering the difficulties which have to be encountered in competing with the many cheap publications which are issued weekly throughout the country.

The report of the Treasurer of the Publishing Commitee as read by Mr. Bullock, gives the usual satisfactory condition of the Committee's finances. It was, on motion, unanimously accepted. Samuel S. Bunting, Treasurer, reported the names of several members who are in arrears to the College. On motion, their names were handed to a committee who will report at the next meeting of the College.

The following preamble and resolutions offered by Prof. Remington were, on motion, unanimously adopted.

WHEREAS, The meetings of the British Association and of the American Association for the Advancement of Science, will take place during the coming month of September, and there will be in attendance many members and others interested in Chemistry, Pharmacy and collateral subjects,

Resolved, That the Museum, Laboratories, and Hall of the Philadelphia College of Pharmacy be kept open during the meetings for the inspection and use of the visitors, and that the Actuary be present during the day, with necessary assistance, to receive the visitors.

Resolved, That a copy of this resolution be sent to the Committee of Arrangements for the coming meeting, and this invitation be extended to the visiting Associations.

This being the annual meeting, the President ordered an election for officers, trustees, etc., and appointed as tellers Messrs. J. W. Ridpath and J. W. Worthington.

Gustavus Pile moved that a delegation consisting of five members, with power to fill all vacancies which may occur, be elected to represent the College in the annual meeting of the Pennsylvania Pharmaceutical Association, to be held in Wilkesbarre in June next, which was unanimously adopted.

Nominations for all the positions having been made, the tellers proceeded to take a ballot, which they announced as follows, viz.:

President.—Dillwyn Parrish.
1st Vice President.—Charles Bullock.
2d Vice President.—Robert Shoemaker.
Treasurer.—Samuel S. Bunting.
Recording Secretary.—William J. Jenks.
Corresponding Secretary.—Alfred B. Taylor.
Board of Trustees (for three years).—James T. Shinn, T. Morris Perot, Joseph P. Remington. Term expires March, 1887.
Publication Committee.—John M. Maisch, Henry N. Rittenhouse, Thomas S. Wiegand, James T. Shinn, Charles Bullock.
Editor.—John M. Maisch.
Librarian.—Thomas S. Wiegand.
Curator.—Charles Frederick Zeller.

Delegates to attend the Pennsylvania Pharmaceutical Association: Gustavus Pile, Alonzo Robbins, Wallace Procter, David W. Ross, William J. Jenks.

There being no further business to claim the attention of the meeting, then, on motion, adjourned.

WM. J. JENKS, *Secretary.*

MINUTES OF PHARMACEUTICAL MEETING.

PHILADELPHIA, April 15, 1884.

In absence of the president, Mr. John W. Redpath was called to the chair, the minutes of the last meeting were read and approved. Professor Trimble exhibited a specimen of *spruce gum*, an article that is largely used as a chewing gum in the New England States. The specimen was sent by Mr. Clark of last years' junior class.

Prof. Trimble stated that the examination of the hulls of the *Liberian coffee* showed the entire absence of caffeine. The beans of this variety of coffee are among the richest in caffeine of any known.

Mr. Redpath asked if there was any analysis of white ash bark published. To this the reply was made that Prof. Power had intended to pursue the study of the alkaloid present in it; it was also stated that the bark was certainly possessed of decidedly remedial properties, as it has been proved in every case reported.

T. S. WIEGAND, *Registrar.*

PHARMACEUTICAL COLLEGES AND ASSOCIATIONS.

PHILADELPHIA COLLEGE OF PHARMACY.—We regret to state that the list of graduates sent to us for publication was not quite correct, and the editor's sickness prevented him from discovering the mistake made by placing the name of Mr. E. E. Johnson on the list. Thus corrected, the number of graduates was 149 (instead of 150, as stated on page 231 of our last number).

MASSACHUSETTS COLLEGE OF PHARMACY.—The sixteenth annual commencement takes place at the Institute of Technology, Boston, May 2. Addresses will be made by H. Sugden Evans, F. C. S., Prof. W. P. Bolles and F. E. Lovell, Ph.G., and prizes of books and a set of hydrometers will be awarded to the following members of the graduating class: C. T. Nixon (Pharmacy, recitation), F. O. Warner (Pharmacy, examination), F. E. Lovell (general chemistry), C. F. Nixon (materia medica), and C. O. Currier (analytical chemistry). President Henry Canning will confer the Degree of Graduate in Pharmacy upon the following candidates:

William Everett Cates, *Sugar of Milk.*

William Arms Chapin, *Estimation of Caffeine in Commercial Samples of Kola Nuts.*
Charles Joseph Countie, *Anthelmintics and their Mode of Administration.*
Charles Ozni Currier, *Iodine and some of its Preparations.*
Frank Townsend Dudley, *Galls.*
Daniel Emerson, *Assays of Commercial and Special Samples of Tincture of Opium.*
Charles Herbert Goldthwaite, *Volatile Oils.*
George Young Hutchins, *Phytolacca Root and its Preparations.*
James Oscar Jordan, *Solution and Tincture of Chloride of Iron.*
Ernst George William Kraushaar, *Alpinia Officinarum.*
Fred. Ellsworth Lovell, *Syrup of Hypophosphites, and Syrup of Hypophosphites with Iron.*
Charles Frederick Nixon, *Glycyrrhiza and its Officinal Preparations.*
William Baines Shaw, *Solution and Tincture of Chloride of Iron.*
Frank Osman Warner, *Citrate of Iron and Quinine.*

Honorable mention is to be made of John Henderson Greer, Ph.G., for having taken and passed a satisfactory examination in the Department of Practical and Analytical Chemistry as an Elective.

EDITORIAL DEPARTMENT.

TRIBUTE TO THE MEMORY OF PROFESSOR DR. R. BRIDGES.—We are gratified to be able to present to our readers the greater portion of the biographical sketch of the late Professor Bridges, written by his friend and associate in science, Dr. Ruschenberger. His labors in the Philadelphia College of Pharmacy during a period extending over half a century, merit such a tribute to his memory, still more so his sterling worth as a man and as a teacher of many pharmacists and physicians now residing in all parts of this continent.

MEDICAL EDUCATION.—At the forthcoming meeting of the American Medical Association at Washington, there will convene, May 5, the Association of American medical editors. The annual address will be delivered by President Leartus Connor, M. D., "On Medical Journalism of the Future," and subsequently a discussion will be had on "How Far can Legislation aid in Elevating the Standard of Medical Education in this Country." The discussion will be opened by Dr. N. S. Davis, and a number of well known physicians have already signified their intention of participating. This subject is also of great interest to pharmacists; for whatever affects the education of the phyician, will exert, directly or indirectly, also the question of proper pharmaceutical education. Ignorant physicians will be perfectly satisfied with, and perhaps prefer to seek the dispensing of equally ignorant apothecaries; while he who is accomplished as a physician and general scientist, knows the value of sound information, and its importance in cases involving the patients' health and lives entrusted to his skill. So does the intelligent layman, and acts accordingly in the choice of physician and pharmacist.

The discussion, then, is likely to exert an influence also upon pharmacy in so far as it may point out ways for reaching the desired end, which have

heretofore not been accessible to pharmacists. The influence of legislation in the past upon both professions has been in two entirely different directions. Laws passed during recent years for regulating the practice of medicine we believe have invariably taken the ground that a physician should possess a diploma as evidence of having acquired sufficient special knowledge to be entrusted with the cure and prevention of disease. If this be so, it would seem that the responsibility of what should be considered as "sufficient," rests with the special educational institutions, and if these cannot be made to agree in the premises, that the law would have to define their position more plainly.

It is different, however, with pharmaceutical legislation, which has nowhere in the United States restricted the practice of pharmacy to graduates in pharmacy, although these are granted dispensation from examination by local boards, in most of the States, having enacted pharmacy laws. The pharmaceutical colleges, therefore, it seems to us, would have as the first duty imposed upon them under the laws, indirectly, it is true, but nevertheless imposed upon them, to mould the material presenting itself in perfect agreement with the law, as far as the individual qualities will permit, although these may be unsuitable for attaining that grade of knowledge which is deemed requisite for graduation.

AMERICAN PHARMACEUTICAL ASSOCIATION.—Mr. Henry C. Schranck, the local Secretary, elected in place of Mr. J. R. Drake, who was unable to act, informs us that the Turner Hall has been secured for holding the next meeting in Milwaukee, and also for the exhibition. The hall is centrally located, within three squares of most of the hotels and accessible by all street car lines, and is lofty, well lighted and ventilated. Applications for space should be made to the local Secretary.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

The Cinchona Barks, Pharmacognostically Considered. By Friedrich A. Flückiger, Ph.D., Professor in the University of Strassburg, etc. Translated from the original text, with some additional notes, by Frederick B. Power, Ph. D., Professor of Pharmacy and Materia Medica in the University of Wisconsin. With eight lithographic plates and one wood-cut. Philadelphia: P. Blakiston, Son & Co., 1884. Large 8vo, pp. 101. Price, bound, $1.50.

The original German edition of this excellent work has been previously noticed by us in detail (see "Am. Jour. Phar.," 1883, p. 56), and the hope then expressed that this monograph might be made accessible to those who are not familiar with the German language, has been realized. In undertaking this labor of love, Professor Power has rendered a signal service to the students of materia medica. Having previously spoken of the merits of the work itself, it remains for us now to speak of the manner in which the translation has been performed, and we may express this by stating that it was done faithfully and by following the original as closely as pos-

sible. The additions made by Professor Power are in Section xiv, on the quantitative examination of the alkaloids, in which Professor Flückiger's method of assay has been given more in detail and supplemented by an illustration of the apparatus serviceable for the purpose. In addition to this Dr. Squibb's process has been rendered so as to comprise the improvements recently made by its author, and the U. S. Pharmacopœia process for assay, which is that of Professor De Vrij, has been likewise embodied, together with his estimation of quinine. When we also state that the excellent plates of the original work have been specially imported for this edition, that new observations and investigations made on the cinchonas since the publication of the German work, have been embodied in this edition, and that the publishers have done ample justice to the character and importance of the monograph, it will be seen that those interested in the study of cinchona barks may be congratulated in having made a work of this kind accessible to them, and this at a cost which is only about one-half that at which the original can be imported, since through the liberality of the German publishing house the plates were obtained without necessitating the expense of making new engravings.

A Companion to the United States Pharmacopœia; being a Commentary on the latest edition of the Pharmacopœia and containing the descriptions, properties, uses and doses of all official and numerous unofficial drugs and preparations in current use in the United States, together with practical hints, working formulas, etc., designed as a ready reference book for Pharmacists, Physicians and Students. With over 650 original illustrations. By Oscar Oldberg, Phar. D., member of the Committe of Revision, etc., and Otto A. Wall, M. D., Ph.G., Professor of Materia Medica, Therapeutics and Pharmacy in the Missouri Medical College, etc. New York: Wm. Wood & Co., 1844. 8vo, pp. 1,216. Price, muslin binding, $6.75.

A work intended as a companion to the Pharmacopœia if prepared with proper care, should be practical and concise, and such a work is presented in the volume now before us. To give an idea of its aims and objects, it is necessary to first explain the manner of its arrangement. It would naturally be expected that the arrangement should be such as to require the use of the index as little as possible, and that the position of each article in common use should be easily determined by those who are likely to consult the book. This has been accomplished in the following manner: The crude drugs and the chemicals follow one another in alphabetical order, the nomenclature being that adopted by the U. S. Pharmacopœia, or for the non-pharmacopœial articles, modelled in accordance with this national authority. All these are indicated by broad-faced type, which is readily distinguished at a glance from the rest; the various preparations made of each drug are then arranged again in alphabetical order without regard to whether they have found a place in the pharmacopœia or not. By transposing the names of these preparations as commonly written, the alphabetical arrangement of the whole work remains nearly undisturbed. For instance, under the drug Opium about thirty preparations are considered under the titles of opii acetum, opii acetum crocatum, opii confectio, opii emplastrum, opii enema, opii et camphoræ pilulæ, etc., closing with opii tinctura pectoralis, opii vinum and opium denarcotisatum. It will be

readily understood that this plan has its decided advantages for the physician, enabling him to consult in one place all that relates to one drug; and while we appreciate the arguments that have been, and may be advanced, from the position of a pharmacist, in favor of such an arrangement, we confess our preference for that of the Pharmacopœia, which brings at least the *preparations* together in classes, and affords an opportunity of giving instructions as to the mode of preparation, preservation, etc., applicable to all. Such instructions are given, together with other practical and critical remarks, under the heads of Emulsiones, Extracta, Liquores, etc.

The drugs proper are treated of as follows: 1. Origin, giving the botanical name and natural order of the plant; 2. Habitat, giving the name of the country, or continent where indigenous; 3. Parts used, mentioning root, rhizome, etc., as the case may be; 4. Description, omitted for pharmacopœial drugs, but reference is made to the page of the Pharmacopœia, occasionally with brief, pertinent remarks, or in the case of cinchona, opium and similar important drugs, with more extended general remarks. These are followed, if required, by a list and characters of the commercial varieties, brief directions for the application of tests, and by an enumeration of the medicinally valuable or pharmaceutically important principles. Each article usually closes with an account of the medical uses and the dose.

Non-pharmacopœial drugs are considered in precisely the same manner, except that a brief description of the characteristic appearance is given similar to those of the Pharmacopœia. For chemicals the first three subheadings mentioned above are necessarily omitted, and as in the Pharmacopœia, no process for preparing them is given; but for non-pharmacopœial chemicals which may readily be prepared by the pharmacist, a more or less detailed process has generally been given.

The formulas for pharmacopœial preparations are in many cases given only so far as is necessary to render the "parts" as given in the Pharmacopœia, in definite weights convenient for use; but for non-pharmacopœial preparations convenient working formulas are given. Since these preparations always follow the drug, remarks on the medical uses are unnecessary; but the dose is given for each both in metric and apothecaries' weight or measure.

Concerning the scope of the work, it may be briefly said that not only the drugs and preparations of the Pharmacopœia, but also those in current use are considered in the manner indicated; and from what has been stated above, it is obvious that the practical usefulness of the book, to the pharmacist in his laboratory, along side of the Pharmacopœia, and to the physician for rapid consultation, is its prominent feature. Concerning the value of the latter purpose, we cannot offer an opinion; but in regard to the former it will be found to be a valuable "companion" as outlined above, and in the numerous practical hints and critical remarks, as well as in most of the 547 wood cuts, representing drugs and their anatomical structure.

The last 100 pages preceding the index are devoted to instructions in the practical use of the microscope, to the microscopical structure of plants, to the administration of medicines, extemporaneous prescriptions, signs, abbreviations, doses, measures, weights, etc.

Elements of Pharmacy, Materia Medica and Therapeutics. By William Whitla, M. D. (Q. U. I.), etc. With lithographs and wood cuts. Second edition. London: Henry Renshaw, 1884. 12mo, pp. 602. Price 10*s.* 6*d.*

This is a work intended for the medical student, and for the use of physicians who may be required to prepare medicines, rather than for that of the pharmacist; yet even the latter may find useful and practical hints in the first 100 pages, which are devoted to pharmacy, and give explanations in regard to the various pharmaceutical manipulations, utensils and preparations, and suggestions concerning difficulties to be more or less frequently met with in dispensing. Part II., occupying 124 pages, contains an alphabetical list of the drugs and chemicals of the British Pharmacopœia, and with each the preparations into which it enters. In each case a few descriptive words are added, which, though insufficient to fully characterize the article, serve to point out some of the leading physical properties; brief outlines of chemical processes are given, together with the dose and the strength of each preparation. Part III. is devoted to the therapeutics of the medicines enumerated before; and Part IV. to non-pharmacopœial remedies, the arrangement in both cases being alphabetical. Part V. treats of the administration of medicines, including the writing of prescriptions and giving several autograph prescriptions, with translations into unabbreviated Latin and English. Part VI. gives the principal tests of identity and purity of the more important remedies, tables of weight and measures, and of poisons and their antidotes.

The work, it will be observed, covers an extensive ground, and the information conveyed must necessarily be brief and often fragmentary in that portion of it in which the pharmacist is specially interested; yet we believe that it serves a very useful purpose in the hands of those for whose information it was written.

Review of the Drug Trade of New York for the Year 1883. Prepared by D. C. Robbins, Esq., for the Twenty-sixth Annual Report of the Chamber of Commerce of the State of New York.

Commercial statistics, if carefully collected, are of undoubted value. In noticing previous reports by Mr. Robbins, we have occasionally pointed out the fact that certain chemicals, which are extensively used and which were formerly largely imported, are now exclusively, or nearly so, manufactured in the United States for home consumption; we have also occasionally referred to the increase or decrease in the importation of certain drugs. We now take from the report the following figures, showing the importation of

	Cinchona.	Quinine.	Opium.	Opium, for smoking.
In 1878.....	4,826,290 lbs.	17,594 oz.	207,752 lbs.	54,805 lbs.
In 1883	3,639,315 lbs.	1,055,764 oz.	229,012 lbs.	298,153 lbs.

The amounts imported of the second and fourth articles have steadily increased during the six years, while the importation of opium has fluctuated very little, exceeding the last amount in two years by 14,000 and nearly 50,000 lbs., and reaching 385,060 lbs. in 1881. On the other hand, the importation of cinchona bark reached its maximum in 1879, with 6,389,378 lbs., and has rapidly fallen off after 1880. We believe that these figures furnish material for reflection.

Die Pflanzenstoffe in chemischer, physiologischer, pharmakologischer und toxikologischer Hinsicht. Für Aerzte, Apotheker, Chemiker und Pharmakologen, bearbeitet von Dr. Aug. Husemann, Prof. Dr. A. Hilger und Prof. Dr. Th. Husemann. Zweite völlig umgearbeitete Auflage. In zwei Bänden. Berlin: Julius Springer, 1884. Vierte Lieferung. 8vo, pp. 985 to 1571.

The Vegetable Compounds in their Chemical, Physiological, Pharmacological and Toxicological Relations. For Physicians, Apothecaries, Chemists and Pharmacologists. Second edition, rewritten. Part fourth. Price 12 marks.

The part now before us concludes a work which in its first edition already attracted the attention of those for whose use it was prepared, and which in its present shape will sustain the reputation it acquired when it made its first appearance more than ten years ago. In noticing the preceding three parts, we have already pointed out the general arrangement of the vast amount of material on hand, and the manner in which each compound is considered, according to its importance. The medicinally most important natural orders of the present part are: Thymelaceæ, Rosaceæ, Leguminosæ, Ericaceæ, Convolvulaceæ, Solanaceæ, Labiatæ, Oleaceæ, Gentianaceæ, Loganiaceæ, Apocynaceæ, Lobeliaceæ, Cucurbitaceæ, Rubiaceæ and Compositæ. Many drugs of more or less importance are procured from these orders; and, aside from the volatile oils, many of these yield proximate principles which are either in common use, like the cinchona and strychnos alkaloids, salicylic acid, the resins of jalap and scammony, etc., or give promise of greater usefulness in the future, like those of the Solanaceæ, Apocynaceæ, etc. After carefully examining the last part, and comparing it with the preceding ones, we feel justified in saying for the completed work what we stated on the appearance of the first three parts, that it shows a most careful compilation of the vast material which has accumulated in the course of time, critical sifting of sometimes conflicting statements, and excellent judgment in giving due prominence to those principles which are of real importance. While we should have liked to see more extended notices of several articles, we cannot but admit that, no matter what special interest may attach to them, these are as yet of no, or but limited, importance considering the scope of the work.

That the publisher has done his part equally well we have said on previous occasions.

Consultation Chart of the Eye-symptoms and Eye-complications of General Diseases. Arranged after Foerster and others by Henry G. Cornwell, M. D., Clinical Lecturer on Ophthalmology and Otology, Starling Medical College. Columbus, Ohio: H. C. McClelland & Co. Price 25 cents.

Alchemical Notation. Compiled from a paper read by Prof. H. Carrington Bolton before the New York Academy of Sciences. New York: Waring & Williams. Price 20 cents.

This chart will doubtless be of interest to students of chemistry in general, and specially to physicians and pharmacists, since it contains those signs which are occasionally seen in old-fashioned prescriptions. That portion of the chart containing the "Chymical, etc., characters" might be somewhat clearer.